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SOME DON'TS FOR TEACHERS

Don't forget to notify our office if you have changed your address.

Don't fail to inform the readers of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION if you have accepted a new position.

Don't let the other fellow assume all of the burden of supplying your professional magazine with articles.

Don't overlook the opportunity and the obligation of informing others of the exceptional projects, shop kinks, teaching devices, methods, and activities that you have developed in your shops.

Don't call the other fellow a thief, simply because he submits an article about something which you believe you originated. Many things have been invented over and over again by people in widely separated parts of the world.

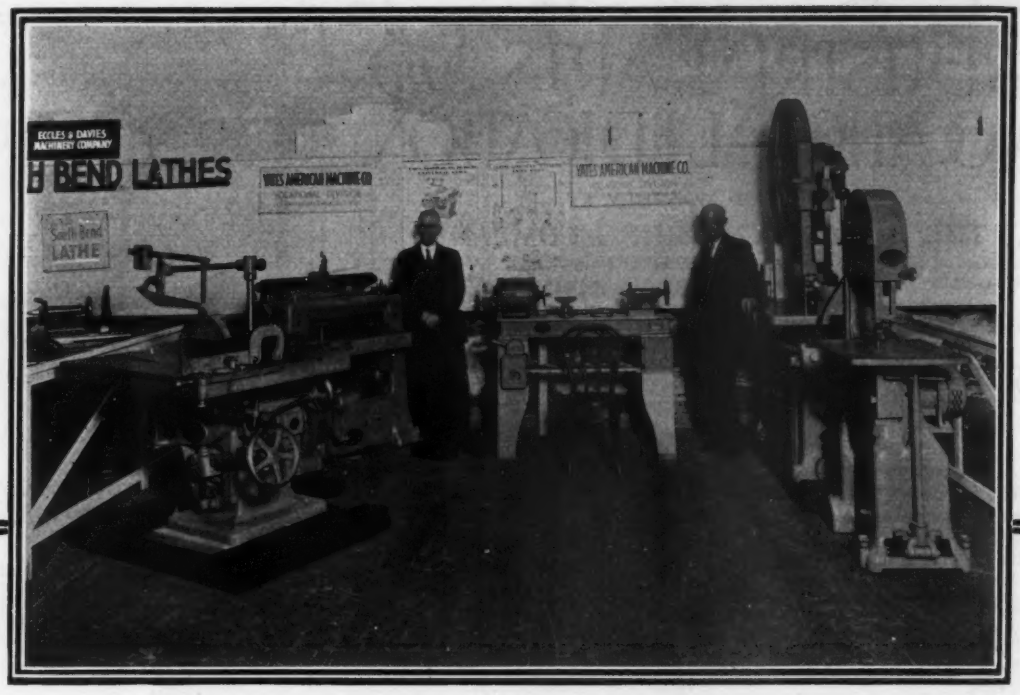
Don't neglect to send news notes about interesting happenings in your school or school system to the editor of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION.

Don't fail to use the posters that come to you monthly in this magazine.

THIS MONTH'S COVER

The cover picture this month shows a 140-in. steel plate mill in action.

Photograph by Publishers' Photo Service, New York City.



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The above illustration shows the Yates-American display at the recent California State Teachers' Convention, Los Angeles, presided over by Mr. H. E. Townsend, manager of the Y-A Los Angeles office (shown at the right) and Mr. Cantrell, of the same office. Equipment on display: Y-16 portable band saw; Y-36 band saw; No. 12 speed lathe; B-4 surfacer; and No. 1 variety saw, all direct motor driven.

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INDUSTRIAL ARTS and VOCATIONAL EDUCATION

Volume 20 OCTOBER, 1931 Number 10

Effective Guidance Through Industrial Arts

*John J. Hatch**

THERE are students of world affairs who tell us that with the coming of the machine age, particularly during the past twenty-five years, a greater change has come to living and home life — as a matter of fact, in all experiences of human endeavor — than has been known for many centuries in the past. If the experiences of children have been so remarkably changed outside of school life during this generation, how can we hope to meet these changing conditions unless the rigidity and inflexibility of the traditional school curriculum be modified to fit students more adequately to present-day civilization?

It is not uncommon for citizens to refer to the good old days in education when the three R's were taught and the experiences of child life entirely omitted from the school curriculum. But there appear to be school people actually in service in the schools today who seem to agree with this traditional policy and in their teaching, who actually attempt to demonstrate that it is still the child's mind, and not his body in coördination with his mind, that requires development. It would seem that through study, surveys, and testing, enough positive facts have been established in all branches of education to cause all teachers permanently to adopt the newer viewpoint of practical education and realize that the "whole" child goes to school.

Our schools should be centered around the "child," and his judgments, aptitudes, and abilities should be taken into consideration, so that his school experiences may fit and match his experiences in life. Probably the coming of the machine age has been greatly responsible for the more scientific, intelligent interest, and study, that thousands of school administrators throughout the country are now taking in the development of school curricula that will actually function in a positive way in present-day life.

As one result of this scientific study, a definite guidance program, to be an integral part of the school curriculum, is being rapidly developed. This newer phase of education should be of vital interest to every teacher of industrial arts, because it gives to the manual activities their true place in education. Surely, exploratory experiences, related information, occupational information, and preliminary vocational training are a vital part and parcel in any progressive industrial-arts program and just as surely these same objectives are decidedly an integral part of any worth-while guidance procedure. This seems to be an indisputable fact, and hence calls for very definite statements regarding the responsibilities of all teachers of industrial arts toward a true guidance program.

Guidance Functions

Guidance, of one type or another, is as old as education. It appears new today because of its present emphasis on the all-round development of the individual student and because of its organization as a public-school movement. Definite organization for the performance of guidance functions has been necessitated by a number of factors. Among these are: (*a*) the increasing complexities of modern life and school organization; (*b*) the rapidly growing number of children remaining in school; (*c*) the increasingly scientific and intelligent interest of school people in school children.

Guidance involves the sympathetic understanding of the pupil's interests, aptitudes, and abilities, together with a conscious effort to help each pupil make the most of these. Guidance is not something you do "to" a child. It is a process whereby you build up in him the desire and the power to do something for himself.

Guiding the young into a suitable lifework is an adventure still so new in education that everyone concerned is sailing on seas that are largely uncharted. Individual analysis and unfavorable occupational conditions have frightened many practical-minded persons, and they have declared the whole attempt visionary and impossible. The analysis of the individual, they say, is superficial and uncertain at best, and if the ideal

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of helping all young people to develop their greatest possibilities were realized, the present occupational world, with its overwhelming number of unskilled and monotonous positions, would not be ready to receive them.

Because variously interested persons have seen different angles of this subject of guidance, the efforts toward a more effective education has expanded to include much that was undreamed of by Dr. Parsons of Boston, in 1908. At the present time, there are some who wish this service defined as individual guidance for living, not simply for earning a living.

Without thinking in particular of any one of its many subdivisions, such as placement, mental measurements, job analysis, educational direction, occupational information, and character development, all of which seem to be in a more or less nebulous state so far as a standardized working program is concerned, it has been simply assumed here that there is a tremendous problem of guidance confronting the schools. If we are to give the right kind of treatment to the situation and make worth-while progress in the study of individual differences, the industrial-arts curricula, the industrial-arts teachers, and the industrial-arts shops must become a more integral part of general education programs of study and administration than they have ever been before. We must take inventory of what we have done in the past and are doing now, and then build our future programs on a safe, sane, and intelligent basis, always remembering that we are a *part of* general education and not *apart from* it.

The aim of guidance is the aim of education: (*a*) training for individual efficiency; (*b*) training for the common good. The two go hand in hand. Right social attitudes underlie the successful growth of individual powers, and these social attitudes are of most value only when coupled with individual efficiency.

Since guidance is concerned with child growth or child development, it is a continuous process throughout the child's entire educational career. As a process which aims toward the best social, mental, and physical development of all pupils, guidance involves:

1. The study of the individual pupil for better understanding of his interests, needs, and capacities.
2. The organization of school life into a rich and varied experience to meet the needs of these pupils for social and individual development in an atmosphere of friendliness.
3. Intelligent pupil-choice of, or school advice about, curriculum selection.
4. Correct placement and adjustment of subject matter and method to the individual in order that he may be challenged to the maximum of his possibilities.

Just as we must have specially trained teachers for mathematics, history, algebra, or industrial arts, so we must have specialists in guidance. The field is even more difficult because it is new and much experimenting and pioneer work must be done. Furthermore, its ramifications bring it into contact with all fields of educational and occupational service, and this demand for diversity of contacts is not so characteristic of the more standardized subjects of the present curriculum.

Lack of Organization

There is a lack of an organized program governing the planning of courses, subject matter, and teaching procedure in such a way that the boy shall pass through a definite series of predetermined activity during his school career.

There is also a lack of a system of comprehensive records of actual progress made by the individual during all of his experiences in school, home, boy-scout activities, employment, and so on, in order that his experiences may be consciously guided in school to cover a certain desirable variety of problems and processes.

A scientific approach is necessary, based upon investigation of home conditions, industrial conditions, levels of intelligence, and other pertinent factors. Dr. Brewer, of Harvard, has said, "Heart-to-heart talks are usually not nearly so effective in guidance as head-to-head talks." Only well-trained counselors can undertake the task as it should be planned and executed, and it would seem that only such counselors should be placed at the head of this type of education in our junior high schools. However, even if this most desirable arrangement in organization can be made, but little real worth can be accomplished by such a plan, unless every member of the faculty in such school becomes an interested and intelligent worker for the cause.

The opportunity and burden of guidance must fall on every teacher. Whether subject teacher, homeroom teacher, organization sponsor, special teacher, or principal, each will find the guidance program his opportunity and challenge. The industrial-arts teacher can judge his own success, not only by workshop achievements, but also by the number of pupils who have set for themselves higher goals of responsibility and personal development because of that teacher's friendly, helpful interest.

Guidance in Junior High Schools

The guidance value of the industrial arts to be fully understood and realized must be considered as an integral part of the total influence of the school. Success for any guidance program depends on proper coördination of all parts of the school program. The industrial arts are a part of the intermediate-school curriculum, not as a specific cure for some ailments, but rather as a part of the warp and woof of the whole fabric to be woven. Every subject in the curriculum has some guidance value, and, unless these different values are properly recognized and coördinated, no true worth will come to any guidance program. That any junior high school should develop a complicated, departmentalized organization and a rich, diversified, and democratic curriculum yet fail to provide definite expert assistance to help students select intelligently from its offerings is unthinkable.

Vocational guidance for all, during the adolescent period, would seem to be an outstanding objective. We ought not to be interested so much in a high standard

for the few as in a higher standard for the many. There is no place today in the public schools for formal so-called disciplinary work which has no function in the life of men and women. Every teacher worthy of the name is and must be a counselor and a guide of youth. Every teacher must know how and where his particular subject should function, and although the guidance program in any well-organized junior high school should probably be headed up by someone expert, each and every teacher on its staff should contribute his full share of time and study to this most important objective.

The junior high school seems to offer an opportunity to eliminate from curricula much of the traditional, abstract, unrelated academic work which does not seem to function in present-day life. Is it any wonder that many students, seeing the uselessness of it, have refused to give their time to it? No doubt this has much to do with the fact that the highest mortality in school life is during the early adolescent period. Put yourself in the place of the average 12- to 15-year-old boy belonging to the 50- to 70-per-cent group who are going to operate machines in industrial plants, lay brick, drive trucks, serve as clerks, bookkeepers, and office boys without further school training beyond the ninth grade, and see what value you would get from the study of ancient history, algebra, or geometry as it has been taught in many of the traditional schools of the land. Put yourself in his place with his choice of lifework and his prospects ahead, and see how much of this abstract unrelated work appeals to you. Most of these boys and girls are not going to college, most of them are not going to high school, but all of them are going into the walks of life attempting to give worthwhile service for their own benefit and for that of the community, and they want and surely need immediate, concrete help along the line of guidance. Of course, the junior high school is not the only type of school that has the responsibility for vocational guidance. Senior high schools, vocational, and trade schools are confronted with this problem. Coöperative courses given in some high schools and the tryout courses given in vocational schools are doing much toward the development of this newer phase of school responsibility, and surely one of the chief reasons for the existence of the part-time continuation-school legislation is the problem of guidance. However, the fact remains that over 50 per cent of all school children do not attend any type of school beyond the ninth-grade level, and for those children the bulk of guidance work must be done in the junior high school.

Motivated Information

Many industrial-arts teachers have been watching with keen interest the development of diversified shopwork during the past few years and have seen in it a most important element, basic to all guidance procedure. Today, a long list of activities being carried out in the schools can be compiled, and whether this expansion is carried on through the composite or general shop or through a series of unit shops does not change the fact that diversified shopwork provides numerous opportunities to apply knowledge gained elsewhere, and therefore teaches the importance of the application of theories and principles to real construction. Many teachers woefully neglect the related and occupational information directly connected with all shop activities, and utterly fail to comprehend that the project being constructed is after all simply a means for the motivation of much academic subject matter and a tangible agency for boy development. The project should never be an end in itself. Many a good shop job that from the mechanical side is completed under the direction of these teachers in six or eight hours has several more hours of study in industrial geography, history, applied science, mathematics, or what not, closely connected with it, and unfortunately this most vital part of the instruction is left undone. The shops should be laboratories in which all academic concepts and principles, which are too often taught abstractly and with lack of real comprehension in the classrooms, can be actually applied.

Again, constructive activities should always be based upon fundamental industrial experiences, essential to the welfare of the individual and society in general. Activities for *mere hand training* will not hold today and are not entitled to a place in the school curriculum. The old-fashioned exercise method in manual training, designed purely for the accumulation of manipulative skill, is a thing of the past. The old "wooden" ideas of imitation, including such models as the coat hanger, flower-pot stand, key board and pencil tray, have passed out of the progressive scheme of things and undoubtedly will never return. In their places, programs have been set up which make it possible to give students a variety of experiences with various tools and materials, fundamental industrial facts, and related information.

Teacher Training

Teachers in charge of such programs should have better professional training than those of twenty-five years ago. A number of years of trade experience or a journeyman's rating in some one industrial vocation is not sufficient. A good cultural background plus professional training is vitally important. Of course, where all three qualifications obtain, the best teachers are usually the result. Industrial-arts teachers, in the better junior high schools of today, must stand on the same general intelligence levels with other teachers on the staff, and be fully equipped to make their presence and contributions felt in the general development of the whole junior-high-school problem. They should be able to make the utmost use of the varied shop activities as an integral part of the entire program of instruction and should be exceedingly well grounded in ways and methods of motivating these activities, so that they will become vehicles of expression for much academic subject content in mathematics, science, geography, and all else in the purely academic program of such schools.

Industrial-arts teachers are frequently criticized because they do not have a sufficiently wide horizon to organize their work in such a manner that it will "mesh in" with other subjects. This criticism can probably be made of any other group of instructors of special subjects also, but it is frequently a fair criticism. Perhaps much-needed help could be given to this whole problem of correlation if impartial administrators could work with the so-called special teachers in curriculum making. Undoubtedly junior-high-school organizations that have been formulated and developed by administrators and teachers who have a keen insight into the proper development of adolescent youth, and who have broken away from the classical and purely academic tradition of our schools of half a century ago, have a much better program of instruction.

Summary

In conclusion, it may be said that industrial-arts subjects are absolutely essential to any junior-high-school plan of organization and they are inseparable from any guidance plan of procedure, which necessarily is a function of this type of school.

Woodwork, metal work, home mechanics, printing, auto mechanics, electrical work, machine-shop practice, and most all of the other activities now offered in our junior high schools will continue to form a major portion of manual work offered for boys, but let us not forget that the type of shop, or the kind of equipment, or the particular terminology given the subject, is not the most important thing to consider. Rather must we see to it that the proper content material is placed in the various activities, that the proper projects and constructions are selected, that the situations created in each workroom are only those that will properly motivate the exploratory experiences desired, develop the related, occupational, and technical information that is essential, and that all activities are properly evaluated and coördinated into a forceful and desirable curriculum.

This is rather a large contract and calls for superior ability in organization and a highly efficient type of teaching and supervision. But surely, the upgrading process in education and the continual improvement of the educators will never be stationary. This, no doubt, is God's gift to education.

Assignment Sheets for Woodworking Classes

*H. H. Robinson**

THE accompanying outline shows pupil's assignment sheets for high-school classes that meet one hour daily for the first semester's work in woodworking. These sheets are given to the student in mimeographed form. They are not instruction sheets, but they refer to instruction or job sheets, charts, and books. They are intended to help the boy answer for himself the question, "What ought I know about this subject of woodworking?" They should serve as guides for the outside study of a text or of reference books. The assignments also serve to help the pupil in reviewing the past work, and they assist the boy who has been absent from class. The appearance of the boy's name on the assignment sheets, together with the topic that he has chosen for special study and class report, tends to add dignity and importance to his report, and tends to obviate hastily and poorly written papers. This point is important, because reports are of little or no value if not properly prepared. Boys who have interesting projects awaiting them in the shop, have little patience with one of their fellows who takes up their time for making a poorly written report. Further, these assignments will encourage the instructor to keep up with his semester's plans. With the addition of appropriate notes between the lines and on the margins, the teacher may use these sheets as detailed teaching plans.

Of course, there are many cases where boys must have individual instruction upon phases of the work before these items are scheduled to come up for class demonstration and discussion. Thus a boy may complete his project long before the majority of the class have completed theirs. Naturally, he wishes to apply the finish immediately. In such a case the teacher should direct the boy just what to do, without devoting much in giving reasons, the boy, of course, being given to understand that such information would be given later — or special job sheets or books on the subject may be assigned. Probably those boys who have in that way applied finishing material before the subject came up for class discussion, may be more interested listeners when the subject is finally studied by the class as a whole.

Since instruction charts are frequently referred to in these assignments, it might be well to speak of them briefly. There are a number of good charts available which are published for advertising purposes. These can usually be obtained gratis. There are, however, not enough of them, and many more might be published. To fill this lack of instructional charts, the writer has prepared some on large drawing sheets.

*Augusta, Kansas.

The lettering on them was done with a large speedball pen, so that they can be read from anywhere in the shop. There are other charts that supplement or consist of exhibits. Such charts serve every purpose that individual instruction sheets would serve.

The following shows the assignment schedule now in use by the writer. Since he has never been able to make such an outline which did not need revisions for the next semester, he presents it, not as a perfect product, but as an attempted solution that has been found very useful.

Assignments for the First Semester's Work in Industrial-Arts Work

In arranging this schedule for reports, demonstrations, and assignments, an attempt has been made to anticipate the principal needs of the class. While the schedule distributes the instruction as uniformly as possible over the semester, the procedure may be changed whenever such changes seem advisable.

First Week

Equipment: You must have a long apron, knife, folding rule, 4H pencil, clean rags, and 25 cents to deposit for a locker key.

Sharpening a Plane Iron: After the demonstration, sharpen your own plane iron and have your instructor inspect it before putting it into the plane for use.

Square a piece of stock to the specified dimensions, following step by step the procedure used in the demonstration. Have each step of the procedure checked as you complete it. Use the chart "How to Square Up Stock" until you have memorized the procedure. Square a second piece of stock to ¾ by 1½ by 10 in. The description of boards should always be written in the following order: first, thickness; second, width; third, length.

The Cross-Lap Joint: In laying out and cutting this joint, follow the same procedure that was demonstrated. See the posted instruction chart if you do not remember the steps. Have your instructor check your layout for the joint before you start to cut it.

The Mortise-and-Tenon Joint: Have your layout for this joint checked before starting to cut it; if you do not remember the order of procedure used in the demonstration, refer to the posted chart.

Second Week

Your Project: Consult your parents immediately and with them look over your home with a view of selecting the most practical piece of furniture for your project. If within your ability, you may start on one of the pieces which you designed last semester. In the files, which contain about 1,000 blue prints, you may find the drawing of a piece that better meets your needs. Remember: We must (at least in part) judge the size of the project that you can likely handle, from your success in doing the work of the first two weeks. After your project has been accepted make a bill of material. After this bill has been criticized, copy it on the printed form.

The Dowel Joint: Joint the two boards to be doweled so that they fit for a glue joint. Have this joint checked before laying out for the dowels. There is a procedure chart posted for your reference if you do not remember the process.

The Keyed Mortise-and-Tenon Joint: Have your layout for this joint checked before you proceed to cut it out. You will likely need to refer to the instruction chart.

An Examination Joint: This double mortise and tenon is to be laid out just as the single mortise and tenon was laid out.

Assignment: Learn the correct name and the uses for at least eight of the common joints shown in the chart. You will be examined on your knowledge of the joints Friday.

Third Week

Get out your stock, following the procedure as instructed. If you are to be successful, you must take advantage of all economies in working duplicate parts. Can you distinguish between a rip and a crosscut saw? (See the Disston Saw Chart.)

Ripping with the Circular Saw: This is a dangerous machine in the hands of an ignorant or a careless operator; therefore, its operation must be restricted to those who have profited by the demonstration. The machine is never to be started without permission. You will be assisted in using it the first few times.

Fourth Week

Glue: ..... (boy's name) will report to the class on the manufacture, preparation, and care of glue.

There is more to the process of gluing up than a rapid demonstration might lead you to believe. Never glue up without getting inspection on your work, and do not glue up the first job without your instructor's aid. There are generally five different items to be considered in the selection and arrangement of boards to be glued for a table top.

Fastening with Screws: Use the chart at the cupboard to learn the proper sizes of holes to use in hard wood. Use soap as a lubricant.

Dressing Up Large Surfaces: Do you know the proper procedure? What four things can be done to make a plane cut smoothly over gnarly wood? Sharpen the scraper as soon as possible after the demonstration, as it is a difficult operation at best. (See the posted job sheet on scrapers.) The proper use of sandpaper requires knowledge and skill.

The Band Saw: Know the kind of bearings on the saw, how to oil them, the size of the machine, its capacity, kind of drive, type of motor, its speed and function of the several adjustments.

Fifth Week

Furniture Construction: The chapter by this name in *Woodwork for Secondary School* is to be studied at home. It will acquaint you with many useful structural methods.

Other Uses for the Circular Saw: Know the kind of drive, the type of motor, how to oil the machine, its speed, its capacity, the correct names for its principal parts, and its danger. Do you know how to cut a set of tenons on the circular saw? (See the posted chart if you need to review on the subject.) What are dado cutters, miter saw, cut-off fence, and ripping fence?

Sharpening: ..... (boy's name) will demonstrate the sharpening of a pocketknife, a butcher knife, scissors, a razor, and a scythe.

Assignment: Bring at least two pieces of cutlery from home and sharpen them for your parents. Know the *general rule* for sharpening tools and the exceptions to the rule. Also, know how to sharpen and adjust a lawn mower.

Sixth Week

Wage Bills: Each day this week you are to keep a detailed memorandum of how each period was spent. On Friday you are to make a wage bill from these memoranda. (See the bulletin board for samples.)

Planes: .....(boy's name) will give a brief history of the development of the modern plane. Know the four common sizes of the common plane and the uses and advantages of each size. We also have three special planes in the cabinet. Do you know their names and uses? Do you know the names for the four principal adjustments on the common plane?

The Six Weeks' Examination will cover all work performed up to date. All of the instruction charts that have been used are now posted for your further study. Take one or more reference books home overnight for further study.

Seventh Week

Wage Bills: Make a memorandum of your time again this week, and from it make out a wage bill for the week on Friday.

Measuring Tools: Know the several uses for the try-square (see the Stanley charts), how to make a pencil gauge, when to use a pencil gauge, how to lay out a 45-degree angle with the framing square, and the common uses for the dividers and inside and outside calipers.

The History of Furniture: ..... (boy's name) will report on the origin of furniture and its early development. ..... (boy's name) will report on the work of Hepplewhite, a furniture designer of the eighteenth century. (See the framed chart for characteristic pieces of Hepplewhite's furniture.)

Eighth Week

Bits: We have seven kinds of bits in the cabinet. Know the name, the uses, and how to indicate the sizes of each kind. On which side of the lips and on which side of the nibs should an auger bit be sharpened?

Braces: We have two kinds of braces and also two sizes of braces. What is meant by "ratchet" and by "sweep"?

How a Tree Grows: After the discussion of this subject, the structure of a log should have new significance for you. (See the diagram.) Know the names for the structural parts, why a quarter-sawed board tends to warp as it does, and how to ascertain the age of a tree.

Saw Milling and Seasoning: ..... (boy's name) will report on this topic. You should know the merits of the two methods for seasoning lumber and the approximate times required for each.

Ninth Week

The Story of Wood: ..... (boy's name) will report on an interesting pamphlet by this name.

Forest Conservation: ..... and ..... (boys' names) will report on the pamphlet *The Forestry Primer*. A few of the most indicative facts that show the need for forest conservation have been posted so that you might remember them.

Adam Brothers, Furniture Designers: ..... (boy's name) will report on these men. (Study the framed chart so that you are able to recognize the outstanding characteristics of their designs.)

Tenth Week

Wage Bills: Keep a time memorandum for this week and make a wage bill on Friday. Remember, you can't be paid for time for which you cannot account.

Grades of Lumber: Know the qualities of the following grades of lumber: A and B finish, No. 1, No. 2, and No. 3. What is meant by S2S.?

Board Measure: What is meant by "board foot" and by "running foot"? Work the ten problems in board measure that have been given to you.

Hardware: ..... (boy's name) will report on the development and manufacture of nails, wire, screws, and files and rasps. The hardware case contains nearly all common articles of hardware with the proper name of each article and also information as to sizes. After a study of this case you should know five kinds of nails, three kinds of bolts, four kinds of hinges, tack sizes, nail sizes, wire sizes, etc.

Chippendale: ..... (boy's name) will report on this cabinet designer and builder. (Study the chart for the characteristics of his furniture.)

Eleventh Week

Woods: We have a separate instruction chart on each kind of wood that is used in our shop. Make a careful study of any six of these woods, giving special study to their identification, merits, and uses.

Sheraton: ..... (boy's name) will report on Sheraton and his furniture. (See the chart for the characteristics of his furniture.)

Saws: ..... (boy's name) will report on the history and evolution of the saw. You should know the meaning of the following terms in connection with the saw: point, rake, bevel, set, and breast. (See the Disston saw chart.) There are eight kinds of saws in the cabinet. Do you know the name and uses for each?

Twelfth Week

Materials Used in Finishing: ..... (boy's name) will report on the production of turpentine, linseed oil, lac, resins, and alcohols. The chart on the composition of finishing materials will require more study than was given to it during the class discussion. Be sure that you know how each kind of material is thinned. After studying the chart which shows the routing for various finishes on different kinds of wood, you should know the order for making either a varnish or a wax finish on a close grain or a common non-porous wood. (Reference: *Units in Wood Finishing,* McGee & Brown.) Assignment: You should take one or more reference books home to study, in preparation for the six weeks' examination.

Thirteenth Week

Tools: You are to make a list of tools including *every kind* of tool to be found in our shop. There are about seventy kinds. Every man and boy should know the proper names for common tools.

Colonial Furniture: ..... (boy's name) will report on Duncan Phyfe and the colonial furniture.

Home Mechanics: Look over the two groups of job sheets, so that you may be acquainted with the instruction available. Check out any sheets that you should like to take home, or better, bring your home repair jobs to school.

Fourteenth Week

Shop Terms: The posted list of shop terms is made up only of common terms that should be a part of your vocabulary.

Modernistic Furniture: ..... (boy's name) will report on modernistic furniture.

Fifteenth Week

Trees as Good Citizens: ..... and ..... will report on a book, *Trees as Good Citizens,* by Charles L. Pack. You should come to appreciate more fully the value of trees. Know how to select, plant, prune, and protect young trees.

Sixteenth and Seventeenth Weeks

Review: Use at least two of the available reference books for home study. Such a study will not only be a good review, but you will gain considerable new knowledge.

Eighteenth Week

Final Examination.

MACHINE SHOP, FINDLAY VOCATIONAL SCHOOL, FINDLAY, OHIO

Making a Halftone

*R. Randolph Karch**

A Related Subjects Lesson for the Printer

THE following description of the processes used in the production of a halftone are given in order to help the printing student to visualize how the halftones which he uses in the printshop are made.

Figure 1 shows the workman carefully cleaning a heavy piece of plate glass with lye. After this has been done, the plate is thoroughly rinsed with clean water.

The next step is to coat the glass with albumen which has been dissolved in water. This process is shown in Figure 2.

After the albumen has thoroughly dried on the glass, it is coated with collodion, as shown in Figure 3 and after this has partly dried, the glass is dipped into a lightproof tank containing nitrate of silver. It remains in this tank for about 5 minutes, during which time the silver nitrate is deposited on the collodion surface, thus making the plate sensitive to light.

After the sensitized plate, now called a "wet plate," is taken out of the tank shown in Figure 4, it is taken to the darkroom and placed into the plate holder shown in Figure 5.

Figure 6 shows a halftone screen. This is made up of two pieces of glass each having oblique parallel lines engraved upon it. The two pieces of glass are cemented together so the lines cross each other at right angles, forming a screen. The number of lines to the inch determines the kind of screen used. Ordinarily, the screens have 60, 65, 85, 100, 110, 120, 133, 150, and 175 lines to the inch.

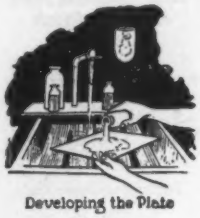
Washing the Glass
FIG. 1

Coating Glass with Albumen
FIG. 2

Coating with Collodion
FIG. 3

Dipping Plate in Silver Bath
FIG. 4

Placing Wet Plate in Plate Holder
FIG. 5

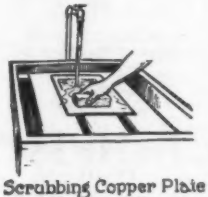


Developing the Plate
FIG. 9

Coating with Rubber
FIG. 10

Stripping the Negative Film
FIG. 11

Squeegeeing - Turned Negative to Plate Glass
FIG. 12



Scrubbing Copper Plate with Powdered Pumice
FIG. 13

Coating Copper with Sensitize Solution
FIG. 14

Figure 7 shows how the half tone screen is placed in back of the camera on an adjustable frame so that it can be moved very close to the wet plate.

After the lens has been uncapped as shown in Figure 8, the light, in passing through the camera, must first go through the screen before reaching the wet plate. This causes the picture to be broken up into many tiny dots.

After the wet plate has been taken out of the camera it is returned to the darkroom where it is developed and fixed as shown in Figure 9. After this has been done, it is called a "negative."

After the negative has dried, a coating of rubber cement is applied, as shown in Figure 10, and after this has dried a coating of collodion is added.

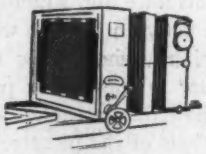
In Figure 11 is shown how the workman is stripping the negative off the glass after it has been cut and soaked in acetic acid.

The negative film is then placed on another sheet of plate glass. This process is shown in Figure 12. In applying the film to the glass the film must be turned upside down so that the finished picture will be like the original when printed.

In Figure 13 the operator is shown preparing a thin copper plate, by rubbing it with powdered pumice and water to obtain a mat surface to which the coating will adhere. This copper plate will later on form the printing surface.

*Supervisor of Printing, Steubenville, Ohio.

FIG. 6



Half-tone Screen Placed in Camera
FIG. 7

FIG. 8

Whirling & Drying the Coated Copper Plate
FIG. 15

Printing Through Negative on Zinc Plate
FIG. 16

After the mat surface has been produced, a solution of fish glue and bichromate of ammonia is applied, to the copper plate, as shown in Figure 14.

The copper plate is then placed in a drying machine and whirled over a gas flame until it is thoroughly dry. This process is shown in Figure 15.

The negative is then placed in a printing frame and the sensitized side of the copper plate is placed in close contact with it. It is then exposed to a powerful electric light for about four minutes, as shown in Figure 16.

The copper plate, now known as a print, is taken into the darkroom and placed under a faucet of running water, as shown in Figure 17. This dissolves all the coating which has not been exposed to the light. Hence all of the coating between the dots disappears. The plate is then soaked in violet aniline dye which colors each dot and makes the picture show clearly on the metal.

The print is then *burned in* over a gas stove, as shown in Figure 18, after which it is cooled slowly. This process turns the coating on the print into a hard, acidproof enamel.

In Figure 19 the workman is shown cleaning the burned-in plate with a mixture of acetic acid and salt in order to remove all traces of the coating between the dots.

The plate is then placed into the electric machine shown in Figure 20. This dissolves the exposed copper between each dot.

Then the halftone plate is reëtched by carefully painting over the dark portions of the picture with an acidproof coating and then etching the rest of the dots again. This is shown in Figure 21. In this process the dots in the lighter parts of the picture become smaller with more white space between them.

Figure 22 shows how the halftone plate is beveled before it is nailed to the wood block. Black border lines, if they are desired, are machined on the plate at this time.

Washing the Coating From Unexposed Parts of Copper Print

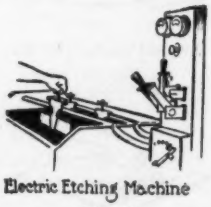
FIG. 17

Burning in Copper Plate

FIG. 18

Cleaning the Half-tone Plate

FIG. 19



Electric Etching Machine

FIG. 20

Re-etching the Plate

FIG. 21

Beveling the Plate

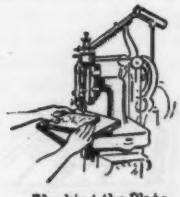
FIG. 22

Hand Tooling the Plate

FIG. 23

Pulling the Proof

FIG. 24



Blocking the Plate

FIG. 25

Planing the Cut Type High

FIG. 26

Figure 23 shows the workman inspecting the plate. Wherever necessary, he hand-tools the plate to insure perfection.

A proof is then pulled and compared with the original copy. This process is shown in Figure 24. If any imperfections show up they must be corrected.

Figure 25 shows a nailing machine which is used to fasten the plate on the wooden block. If the engraving is to be used on a patent base, it is beveled and planed to exact height so that the plate and base together will be exactly type high.

Figure 26 shows the planing machine on which the back of the wooden block is planed off until the halftone is exactly type high. After this has been done, the plate is ready for the printer.

Halftone Screens

On the 65-line screen halftone shown in Figure 27 there are 65 parallel lines to the inch each way, making 4,225 dots to the square inch. Finer screens, of course, have smaller dots. Figure 28 shows a 85-line screen, and Figure 29 a 100-line screen.

FIG. 27

Figure 30 shows an enlargement of a section of Figure 27. It has been enlarged 8 times. If one holds this figure at a distance and squints the eyes slightly, the resemblance between the two will be noticed. This enlargement plainly shows how the black dots almost come together in the darker parts of the picture. It also shows how they actually do come together in the blacker portions of the picture. In the lighter parts of the picture the black dots are farther apart.

Suiting the Screen to the Paper

Different halftone screens are used for printing on different kinds of paper stock. The 65-line screen is used mostly for newspaper work. The 85- to 100-line screens are used for rough paper and by newspapers that do not stereotype their newspaper forms but print directly from type. The 100- to 133-line screens are used for the common finished book paper. Screens over a 133 line are used for printing on the finer kinds of enameled paper stocks. A fine-screen halftone cannot be used on rough paper because the dots would be forced into the fibers of the paper. This would, in turn, force ink into the space between the dots, filling in the open spaces with ink and the results would be dirty printing.

FIG. 28

FIG. 29

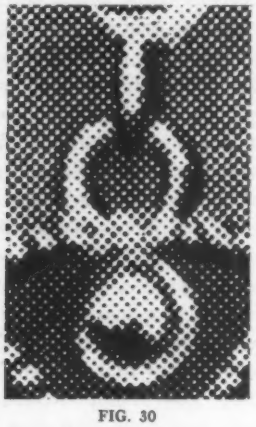


FIG. 30

Screen Guide

News stock	55 to 85 screen
Bond, ledger, linen cover	85 to 100 screen
Machine-finish book, S. and S.C.	100 to 133 screen
Dull-finish coated book	120 to 150 screen
Enameled stocks	150 to 175 screen

Copy for both line etching and halftone work may be reduced or enlarged. It is better, however, to have the copy larger than the size of the plate wanted, as this will make the lines much finer and have a better effect.

A copper halftone will wear well for over 150,000 impressions, a zinc etching for over 150,000, and a zinc halftone for over 200,000 impressions.

Making Halftones from Colored Copy

Blue copy reproduces almost white, white reproduces a light gray, purple a medium gray, bright green a dark gray, bright yellow almost black, black of course reproduces black. A glossy-print photograph makes a better halftone than a dull-finish one.

In preparing copy for line etchings, India ink should be used because other inks do not reproduce so well.

Bibliography

Hacklemann, *Commercial Engraving and Printing*, pp. 217–301.

Horgan, *Photo-Engraving Primer*.

Gress, *Handbook of Printing*, pp. 210–212; 216–224.

Plates by courtesy of the Baltimore-Maryland Engraving Company, Baltimore, Maryland; and the S. D. Warren Company, Boston, Massachusetts.

Electricity in the Secondary Schools

*E. W. Jones**

THE inherent needs of human nature are the true objectives of education. The preparation of young people to take their part in the teamwork activities of society should be the very practical purpose of any educational program worthy of the name. The school curriculum of today should be built up out of the intellectual resources used in operating our social institutions. Not merely the institutions as they are at present, but as they may become and should become; a curriculum that parallels the needs of the present and prepares for the needs of the future.

It is a comparatively new and, partly for that reason, a much-neglected item in the present-day curriculum that here claims our attention — the subject of electricity in the secondary school. So universal is the use of this modern form of energy, touching, as it does, the everyday lives of so many people in nearly every line of human endeavor, that any boy, or any girl for that matter, who is deprived of a chance, somewhere in his school career, to study the essential facts of its behavior and use, is handicapped at the very beginning of his productive years, and that regardless of his future calling.

In order to state the case more clearly, let us recognize at the outset the two basic reasons for obtaining an education — the vocational and the cultural. In vocational education we find training for industry, the

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preparation for a life's job, the specialization that makes for efficient production. In the cultural, we see a training for common participation in the great institutions of society, a preparation for the wise use of all the intellectual resources of the past and present, a generalization that gets us ready for capable consumption of the products of industry. While the lack of vocational training adequate to the demands of modern industry would seem to be the biggest gap in our present educational program, we must insist that the cultural be not lost sight of, that the two be articulated into one another, and that every citizen be given both to meet the needs of democracy.

If the intelligent use of electricity is to function in everyday life, knowledge of it must come into the minds of our young people. They must be furnished a schooling that really parallels this phase of the civilization in which they are to live. But the problem of paralleling the school with the real world outside the school is complicated in our time by the rapidity and extent to which the world is changing. Electricity is an example of that change. Within a generation it has grown from a seldom-considered source of power to one of our most universal, but, withal, least understood, utilities. A new industry has been built up, with many ramifications. New methods and standards have been established, in the home, in travel, in communication and transportation, in commerce and manufacturing, in all the techniques of industry, even in amusements and the arts and sciences. A new vocabulary of terms and meanings has been introduced, almost as complicated and confusing as a foreign tongue. Old modes and methods have become obsolete. An accelerated social order is taking shape before our very eyes, and the end is not yet. Changes are occurring now, greater and faster than ever before in history, changes that are "penetrating into all the invisible depths of our social order, even altering the relationships of human life." Coal, petroleum, and falling water have been harnessed to provide the power, and electricity has been employed to distribute and apply it, so that we are enabled to do the world's work faster, cheaper, and better, perhaps, than ever before.

But how may this new knowledge best become a part of the mental capital of the race? There is very little in the social heritage to supply it, and that little is steeped in tradition and mystery. Although recognized as a potential force for centuries, our practical knowledge of electricity had its beginnings only about a hundred years ago. For decades later it remained the problem of the scientist and the plaything of the inventor, then, more recently, the tool of the engineer. Information as to its activity and application was the exclusive possession of those specialized groups. Now its use has spread out into every walk of life, but not its understanding, for how much have we learned about it, compared with the knowledge of other items of no greater importance in the modern environment? Our grandfathers could hand us down nothing, and our fathers but a trifle more. What the present generation knows are chiefly the cost and the fear of electricity, very little of its intelligent application, of careful and economical use and of the rules of safety. Is it reasonable or commendable that we should remain in ignorance of a matter so close and vital when the information necessary is within reach? And where is there a better agency, or rather, any other agency, to impart this information than the school?

For the general purposes of everyday life the knowledge of electricity need not be extensive or technical. Courses should be organized for students who are not to become electricians in any sense, covering only the fundamental science facts, the operation, care, and upkeep of the common consuming devices, and the ordinary rules of safety. Education of the consumer or user should be the aim of such instruction, not the training of expert workers. This knowledge should be simplified, visualized and vitalized, and to this end every child, sometime during his training period, should come face to face with the essential information needed every day by everyone to promote the intelligent use and full enjoyment of the many time- and labor-saving electrical devices found all about us.

Girls as well as boys should take this general course, since they have as much, or even more, use for it. A well-known educator of women has this to say:

"Girls should receive such instruction; even our college women need it. Seventy-five per cent more women use electrical devices than men, devices of which they should understand the working principles, and especially the care and repair. It is ridiculous that a woman must take a defective iron cord downtown to an electrical repair shop and pay dearly for the services of an expert, when a few minutes of simple work on her own part at home will do the job at a fourth of the expense in time and money."

A short unit course would suffice, made practical and interesting and demonstrated at every step by means of the ordinary electrical circuits, materials, and appliances. Much of the "mystery" of electricity may be thus explained, its ways familiarized and its sources, uses, and dangers made a matter of common knowledge.

So much for the general aspect.

Vocational education is for a different purpose and should receive a different treatment. It is training for production, where specialization is required. It is preparing for industry, in which, due to the modern division of labor, different persons, possessing different aptitudes, need different mental equipments and skills. Vocational efficiency should be the universal possession of all, and every citizen must be given a real opportunity to secure vocational training suitable to his tastes and talents. And this, as nearly as may be, shall be provided by the schools, in the new curriculum, since a very important part of every young person's education consists of active participation in the world's work.

The first electrical course taken by the boy who may seem vocationally inclined toward the subject, may

very well be the general course recommended in the foregoing for all boys and girls. For him it will serve as exploratory, to discover his aptitudes and preferences and to guide him in the choice of a school career, at least, if not a life's career. This first course should be followed more or less closely by a second, also fundamental in character, but more technical, beginning with the simplest facts and proceeding toward the more difficult and involved as the work progresses. The second course should seek to introduce in an elementary way and build around personal experience, the rather complicated science content of electricity as a subject, without which no comprehensive understanding of the working principles of electric circuits, appliances, and machines can be grasped. It should serve to satisfy the natural curiosity of the active boy as to the why and how of things, and replace the too-frequent attitude of fear and mystery with the understanding and confidence of practical reality. It should also lay the foundation for a more intensive study of electricity if he still elects to specialize in that direction and choose it for a life's vocation.

The courses just mentioned may be offered during the seventh, eighth, or ninth grades, preferably eighth and ninth, and should cover a total of two to three semesters' work. The first, or general course, where given as prevocational, should be required of all boys; the more technical course, offered as an elective, would be chosen only by those especially interested.

To install these courses where no electricity is included in the curriculum at present, it would not seem necessary or best to lengthen the training period, but to replace, in the grades suggested, a part of some overdone subject, such as woodwork, which, for vocational purposes has been stressed in many schools out of all proportion to the world's demands. That other things equally important have been neglected is now being recognized and acted upon by leading schoolmen, and there are strong indications that electrical courses are beginning to receive their just share of interest and serious consideration.

In many school systems the study of electricity will not be carried beyond the junior high school. In others, however, demands arise for a senior-high-school course of an advanced, vocational nature to follow closely the work previously taken. This course should be planned for the boy who has quite definitely decided to follow electrical work as a life's vocation. It need not specifically fit him for some single trade, but should lay a broad foundation in the fundamentals of theory and practice that will enable him to take up such lines as opportunity may offer. Should he go on to college for a course in electrical engineering, as a very few will be able to do, such a preparation will prove to be of supreme help and value.

It is the writer's opinion that all these courses should be made strong in shopwork, laboratory demonstrations, and field trips so that personal participation by the students themselves under the conditions of controlled experience may give vitality to the principles studied. The use of electric materials and tools, the handling and observation of real circuits and apparatus, and the construction of devices that successfully operate give a breadth and depth that can be obtained in no other way.

During the last year or two of the training period the boy should be encouraged and helped to obtain part-time employment in the trade itself to gain valuable contact with the special line of electrical work he may decide to do after completion of his high-school course. Thus his schoolwork will be strongly and naturally motivated. He will not drop out from lack of interest, because he can see a vocational advantage in remaining and there will be built up within him a steadying and satisfying sense of importance in his choice of a life's work to dim the dream of the white-collar job indulged in so often to his own detriment by the average high-school graduate.

Furthermore, there will be less of the charge made by industry and business that graduates of high schools have little of value to show for their years of training, due to the lack of correlation between the work within the school and the world outside the school. Such a charge is too prevalent and well founded. The proper solution of the problem, however, lies within the school itself.

Trade English

*W. E. Belleau**

EVERY boy who is enrolled in a trade course at the Boys' Technical High School, Milwaukee, Wisconsin, must study certain specified subjects, closely related to his trade. Although practically all of the courses require English, science, and mathematics, the phases of these subjects that will be studied are determined by the nature of the trade and the needs of the individual. In each subject the aim is to provide the student with knowledge, skills, and attitudes that will be absolutely essential in adult life.

Students enrolled in any trade except printing are exempt from taking trade English if they have successfully completed the ninth grade. A printer must study English regardless of the number of semesters of high-school English he has passed. However, he is exempt from taking any phase of English on which he can write a 90-per-cent test.

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Curriculum

As previously stated, the English requirements are not identical for each trade. An outline of the Trade English Curriculum follows:

A. For the automotive mechanics, carpentry and cabinetmaking, electrical, machinist and toolmaking, patternmaking, plumbing, and mechanical-drafting trades:
   1. Sentence structure.
   2. Recognition of verbs, verbals, and verb phrases.
   3. Study of tense: Present, past, future, present perfect, past perfect, and future perfect.
   4. Study of principal parts of verbs.
   5. Study of verb forms frequently confused, i.e., lie, lay; sit, set; shall, will.
   6. Study of the noun: Number, gender, and case.
   7. Study of capitalization: Principal rules.
   8. Study of abbreviations and contractions.
   9. Study of pronouns:
      a) Subject of a verb expressed or understood.
      b) Object of a verb or preposition.
      c) Predicate complement.
      d) Antecedent.
      e) Gerund.
      f) Infinitive.
   10. Adjectives: Phrases, clauses, comparison.
   11. Adverbs: Phrases, clauses, comparison.
   12. Punctuation:
      a) Period.
      b) Question mark.
      c) Comma: Dependent clause, series, parenthetical (3), separate two main clauses.
      d) Semicolon: Omission of connective, separate long main clauses.
   13. Spelling.
   14. Parts of letter and letterheads.
   15. Paragraph: Unity and clearness.
   16. Kinds of letters:
      a) Application.
      b) Recommendation.
      c) Ordering goods.
      d) Selling goods.
      e) Itemized bill.
      f) Inquiries.
      g) Collection.
      h) Friendly.
   17. How to advertise for help and for work.
   18. Checks, receipts, promissory notes, etc.
   19. Telephone and telegrams.

B. For the architectural-drafting course:
   1. Same as for A Group.
   2. Study of verbs:
      a) Regular and irregular.
      b) Transitive and intransitive.
      c) Voice and mode.
      d) Additional exercises.
   3. Noun clauses.
   4. Additional exercises in sentence structure.
   5. Prepositions: Simple and compound.
   6. Miscellaneous drills on grammatical errors.
   7. Punctuation: All comma, semicolon, and colon rules.

C. For printing course:
   1. Same as A and B Groups.
   2. Additional work in sentence structure.
   3. Additional exercises on pronouns, adjectives, adverbs, and verbs.
   4. All punctuation rules.
   5. Syllabication.
   6. Compound words and hyphens.
   7. Sentence: Unity, clearness, and emphasis.
   8. Italics.
   9. Study of the dictionary.
   10. Study of vocabulary: Similar words, i.e., affect, effect; principle, principal.
   11. Proofreading.
   12. Outside reading.

Materials

Seeing that the instruction is entirely individual, it is necessary to have more equipment and aids than would be necessary in group instruction. Each student is supplied with direction sheets, lesson sheets, and sample sheets. All that he needs to purchase is a notebook which is never taken out of the classroom except by special permission. The lesson sheets refer the students to various textbooks and exercise pads, several copies of which are kept in a small library in the class. The students take their turn in acting as librarian, because each book borrowed must be charged to the student.

Method

The amount of time required to complete the English course depends entirely upon the individual, for he may work as rapidly as he can. However, it takes approximately one semester to complete the course, except for the printers who need two semesters. The maximum class size is twenty. The methods used for teaching printers, which vary little from those used in teaching students from other trades, will now be discussed in detail.

When the student registers for the course, he is given a diagnostic test which includes every phase that he is to study except spelling, syllabication, dictionary work, letters, and outside reading. He is exempt from studying the phases on which he receives a grade of 90 per cent or above. Then the boy reads a book on *How to Study* to assist him to utilize his time profitably. After he has written an objective test on this book, he is assigned to read a few mimeographed pages concerning the importance of studying English. His next task is to read "Instructions to Students Entering the Course," a copy of which follows:

Instructions to Students Entering the Course

1. The progress you make in this course depends absolutely on your own ability, interest, push, and regular work. No slower students in the class will hold you back. The instructor will give you individual attention and will insist that each lesson is correctly done before you may pass on to the next. You are *on your own* from now on.

2. On the bookshelves in the room are several books, all of them numbered. These are referred to in the lessons and are to be used as required. You may draw any of these books from the student librarian by writing your name on the charge slip. In the case also are lessons, which are *all numbered*. They, as well as the *samples*, are always to be found and replaced in the box above the number. All these materials are for your use, but *not for abuse*. Remember that others are using them. You should try to keep them clean, and above all, not to put pencil marks of any kind on them.

3. All of your written work is to be done in a large, bound notebook about 8 by 11 in. in size. No small-sized notebook will be permitted. You are to leave your notebook with the student librarian. If you wish to take it from the room, see the instructor about it. Use a medium-soft pencil, and keep it well pointed. Have your supplies at the next meeting of the class.

4. Secure practice paper from the student librarian. Write a letter to the instructor telling of the English or language work you have had. Tell where and when you had it, who your teacher was, what studies you liked and disliked, what you did best and what worst, and what you consider most important. When you are sure that the letter is the best that you can write, give it to the instructor.

5. Secure from the instructor a copy of the general and trade spelling sheets. These are yours to keep. Obtain a copy of the *Horn-Ashbough Speller* from the librarian. Ask the instructor about how to use it.

6. Now you are ready to begin Lesson I. Proceed with the other lessons in order. When you have studied what you are to do in each lesson, write your name on the waiting list. Study your spelling until the instructor calls you. If you understand what you are to do, the instructor will permit you to continue with your lesson. Otherwise he will give you assistance and refer you to other books. *Never* work more than one section without checking up with the instructor. Always study your spelling lists if you have to wait.

As previously stated, the student is not permitted to work the exercises of any lesson sheet until he

Lesson No. 4

I. It is one thing to know the forms of the verbs we have studied, but quite a different thing to use them correctly all the time. There is no sense in learning all these forms unless you determine to "watch your step" constantly and try always to say and to write them correctly. It is hard to say "I *saw* him in the machine shop," "He *threw* the ball to second," "We have *broken* two drills," when your companions are wrongly saying "I *seen* him," "We *trun*," "We have *broke*," but if you have the proper stuff in you, you will *want to be right* in your language, just as you *want to be skilled* in your trade.

II. Here are some mistakes often heard with the verbs you learned in lesson 3. Correct them by writing the sentences as they should be, and be prepared to explain why you made the correction.

1. I knowed it was you; where you been all the time?
2. We hain't began that exercise yet.
3. The wind blowed the ball out of line.
4. There; I've broke the point off my pencil.
5. It was a hot day, and I drunk more than I had drank in a week.
6. I drawed the line wrong, and when the boss seen it, he come over and scold me.
7. After we had drove above ten miles our left front tire busted and we run into a ditch.
8. We got ketched in the rain.
9. If I had of saw the principal about it, maybe we could of went on the shop trip.
10. By six o'clock the water had rose a foot, but the next morning it had fell again.
11. He come very near getting his leg broke.
12. I laid in bed pretty late, but my father brung me to school in the car, so I wasn't tardy.
13. He wuz settin in the street car when the boy got ran over.
14. After we had took out the old pipes we give them a good cleaning.
15. Have you ever froze your ears?
16. He asked me if I had ever rode in an airplane.
17. After we had et our dinner we set on the shore awhile and then swum out to the boat.
18. After Jimmy had went to class, he remembered that he had left his book laying on the bench.
19. The coach knowed we done it, for he seen us in the gym.
20. The trees growed so clost together that we couldn't git through.
21. After a lady had came out to sing, the whole company come out.
22. He clumb over the fence and run for home.
23. When I seen him do it I through a stone at him.
24. When the pitcher trun the ball to first, Davy run to second.
25. I have wrote twenty-five sentences correctly.

Lesson No. 8

I. Take Book No. 7 and read carefully pages 96 to 99.

In the list of 50 words below over half form their plurals irregularly according to some of the rules you have just been reading. Write the exercise following the list into your notebook, filling each space with the *plural form* of the word whose number is in the space. Consult Book No. 7 as you write.

1. article	9. child	17. goose	26. mouse	35. railroad	43. tool
2. asylum	10. church	18. institution	27. net	36. sanatorium	44. tooth
3. battery	11. city	19. knife	28. opportunity	37. —self	45. toothbrush
4. beauty	12. compass	20. lathe	29. ox	38. sheep	46. trap
5. boy	13. drive	21. leaf	30. park	39. shoe	47. trolley
6. brush	14. factory	22. loaf	31. piano	40. suburb	48. wife
7. building	15. fish	23. machine	32. press	41. theater	49. woman
8. calf	16. glory	24. man	33. product	42. thousand	50. wrench
		25. motto	34. punch		

The (4) of Milwaukee

Not many (11) the size of Milwaukee have as many (14) as there are here. (42) of (24) work in them and these (24) use both (47) and (35) to go to work. Their (48) and (9) often secure employment also. Among the (1) manufactured are (6), (31), (19), table (21), (46) for (26), (39) for both (24) and (49), (27) for (15), (22) of bread, (45), artificial (44), and (25) for (10).

Near by, in the town of Wauwatosa, are several (2) and (36), besides other county (18), such as the School of Agriculture, where (38), (29), (8), and (17) are raised, in addition to many other farm (33). This school is not so large as the (5) Technical High School, but its location, as well as that of other county (18), is much more beautiful.

Our time is too short to describe all the (4) of our city, its (13), its office (7), its (41), its residence (40), and its (30). But we should not forget, while we are working with our drill (32), (20), (3), (34), (50), (12), and other (23) and (43), that we are a part of a wonderful city, surrounded by many (28) for both pleasure and profit, if we will but exert our (37) to take advantage of them.

demonstrates to the instructor that he understands the principles of the lesson. At that time the instructor takes opportunity to motivate the work by explaining to the student the importance of mastering that lesson.

Unless the student has 90 per cent of his exercises written correctly and can explain the reason for his choice of words or for his alterations, he is given assistance and additional exercises to work until he becomes proficient with that phase of the course. Provision is made for review according to the principles of learning discussed by Gates in his *Educational Psychology*. At the end of every fifth lesson, the student is asked to write a one-page theme illustrating that he can make practical application of the knowledge learned in the five previous lessons.

In order to assist the reader to better understand the course of study, a few lessons and a few exercises have been inserted in this article.

Spelling

Besides studying a general spelling list and the *Horn-Ashbough Speller*, a student must study a special group of words that pertain to his trade. A few illustrations of these words are:

braces	hand press	operator
compositor	impression	overlay
copperplate	imprint	ply
cylinder	intertype	presswork
dummy	keyboard	quoin
editing	letterpress	reprint
electrotype	lithograph	serif
etching	matrix (matrices)	spacing
galley	mitering machine	stereotyping
gutter	monotype	typographic

Grading

The student's monthly grade is based upon his progress and the quality of his work. His final grade consists of the monthly grades, a test in spelling and syllabication, an acceptable theme, and another form of the diagnostic test administered when the student entered the course. If a boy fails to obtain a grade of 90 per cent on spelling and syllabication or on any part of the achievement test, he must study those phases until he has mastered them. Experience has taught us that a high standard of English is necessary for printers, hence they are constantly reminded that they must continue to study English after they are graduated.

A Check-Up on Type Distribution

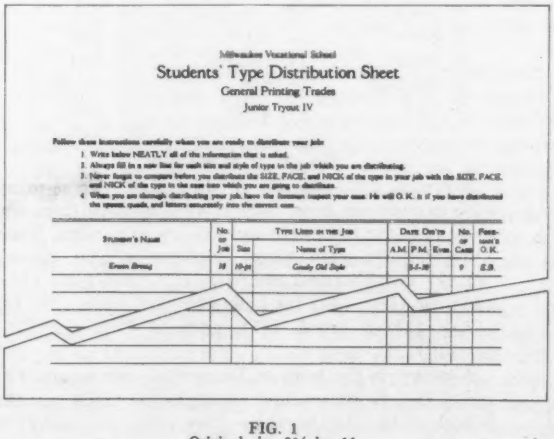
*William J. Patlow**

THE late Robert H. Rodgers once stated as he visited the printing class that if a plan of procedure or system of records worked satisfactorily, its continued existence was justified.

A very perplexing and annoying condition sometimes exists when there is no system of records used in the distribution of type. It seems that no matter what type case is set from, there is evidence of careless and incompetent distribution, and if there are no records, no one can be held responsible. The space and quad boxes are in poor condition, bold-face type is found in the light-face type cases, italic faces are found in the roman-face cases, and 6- and 8-point type are found in the 10- and 12-point type cases. This causes many ambitious students to become discouraged when they attempt to set up a job. They find that their progress is hindered, ther enthusiasm wanes, and being under the impression that the type cases are in the same condition in all printshops, they decide that printing is not the trade which they want to enter.

The type cases in a school printshop should be models. They should be as clean or cleaner than those found in the commercial printshops. Only then can a student be expected to find out whether or not he likes printing, because then the type cases at school are really comparable to those at which he would be expected to work in a commercial printshop. A student ought not to be expected to set type from a case that is pied, any more than a carpenter or machinist student should be asked to work with dull or inadequate tools.

There seems to be a certain psychology connected with the fact that when a student is asked to sign his name for anything that he uses or does, he becomes more cognizant of his responsibility. He knows then that he can be checked and held accountable for anything that goes wrong. When a book is taken from the public library, a record is kept of the drawer's name, the name of the book, and the date on which it


Milwaukee Vocational School

Students' Type Distribution Sheet

General Printing Trades

Junior Tryout IV

Follow these instructions carefully when you are ready to distribute your jobs

1. Write below NEATLY all of the information that is asked.
2. Always fill in a new line for each size and style of type in the job which you are distributing.
3. Never forget to compare before you distribute the SIZE, FACE, and NICK of the type in your job with the SIZE, FACE, and NICK of the type in the case into which you are going to distribute.
4. When you are through distributing your job, have the foreman inspect your case. He will O. K. it if you have distributed the spaces, quads, and letters accurately into the correct case.

Student's Name	No. of Job	Type Used in this Job: Size	Name of Type	Date Distributed: A.M.	P.M.	Even	No. of Cases	Foreman's O.K.
Ernest Strong	18	10-pt.	Goudy Old Style		2-1-31		9	E.S.

FIG. 1
Original size 8½ by 11

*Milwaukee Vocational School, Milwaukee, Wis.

was borrowed. It must be returned in good condition when it is due or a fine is assessed. Many industrial plants require the name of the person, date, hour, etc., to be written on a specially prepared form when a special tool is desired. Without a doubt the tool is returned in good condition because the record on the card holds someone responsible for it.

The same principle can be applied to distributing type in the school printshop. When many students distribute type, it is practically impossible for the instructor to remember when and what John or George distributed. When John signs his name on the "Students' type distribution sheet" shown in Figure 1, and also records the number of his job, size and style of type, date of the distribution, and case number, he is more likely to distribute the type into the correct case and proper compartments because a permanent record has been made of it. He knows that the class foreman must O.K. his case immediately after he has distributed the type and that the instructor also inspects it.

If Henry sets from the case on the same day, on the next day, or a week later and complains about the case being pied, it is possible for the instructor to shift the blame where it belongs.

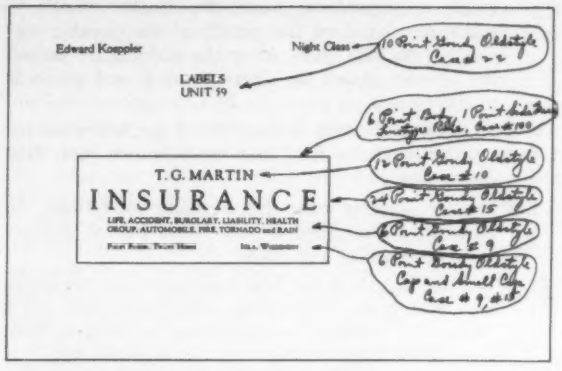


FIG. 2
Original mounted on an 8½ by 11 sheet

The beginner in printing usually finds that he cannot always remember the names of the sizes and styles of type that he has used in his job. This can be eliminated by having the student write opposite each line on the final proof, as shown in Figure 2, the sizes and styles of type used, and also the case numbers from which the various sizes of type were taken. The instructor is thus enabled to check this over before the student begins the distribution of his job.

Student Participation in Checking Mechanical Drawings

*E. A. Rerucha**

VARIOUS methods are used by instructors of mechanical drawing to make the instruction more effective and to enable each student to do the highest grade of work possible with his particular abilities. With these objectives in view, the writer has adopted a method for checking drawings in which the students participate as checkers. Every instructor of mechanical drawing is familiar with the many omissions and faults which appear on student's drawings, particularly during the first year of drawing. To correct these faults in most cases requires personal attention, because a blanket criticism of the work of the class is not always effective. However, to give the necessary personal attention to every minor fault is not always possible, particularly when the instructor has other duties, such as supervising another class, while the drawing class is in session. From the writer's experience, the plan described herewith makes it unnecessary for the instructor to make a personal correction of minor faults, because many of them can be made a part of the student's responsibility. This scheme not only serves to check the faults of each individual, but also brings each individual into intimate contact with the errors made by the entire class in the application of drafting principles. Then, too, it provides actual checking experience, the students serving as checkers and the instructor as chief draftsman. It also provides valuable experience in the reading of drawings, especially if the instructor follows the policy of not having the entire class working on the same problem.

The general procedure is as follows:

I. A schedule is drawn up according to which each student of the class takes turns serving as checker for a given period of time or for a given number of drawings.

II. Four trays are provided for the drawings and labeled as follows:
   - No. 1. Drawings To Be Checked
   - No. 2. Drawings Checked
   - No. 3. Drawings Corrected or Redrawn
   - No. 4. Drawings Approved and Graded

III. When a student completes a drawing according to the usual class procedure he places it in tray No. 1. The drawings are left in the untrimmed form so that, if necessary, the drawing can be placed back on the board for correction. This will avoid thumb-tack holes on the finished drawing.

IV. The drawings submitted by the students in tray No. 2 are now checked by the student checker. He makes his notations and corrections very lightly with a colored pencil so that they can be erased by the student after the corrections have been made. Any re-

*Wakefield, Michigan.

marks or suggestions which the checker wishes to make are placed on the margin of the drawing outside of the trim lines. After the drawing is checked the checker places his signature on it and places it in tray No. 2.

V. The checked drawings in tray No. 2 are now available to the students for their examination and final corrections.

VI. When the students make the necessary corrections, the drawings are returned to tray No. 3 for the instructor's examination and grade.

VII. When the final check has been made and after the grades have been given, the drawings are placed in tray No. 4 where the students are privileged to examine them after which they are filed away in the usual way.

Students are urged to make it a habit of examining the trays every class period and to keep the system in operation so that a large number of drawings does not accumulate in the trays. All drawings are required to be corrected and ready for the instructor's grade and final checking after a prescribed length of time from their appearance in tray No. 1.

The drawings are at all times before the instructor so that he can see the progress being made by the checker and the students in making corrections. Of course, if no corrections are required and the checker has no suggestions to make, he places the checked drawings directly in tray No. 3.

Before adopting this system the writer was skeptical about the reliability of students as checkers. It was felt that perhaps the students would regard it merely as a requirement of the course and check the drawings in a casual way, not taking into consideration the instructional value of the scheme. Also, it was felt that some confusion might result from the inevitable discussion between the checker and the maker of the drawing. However, the results have proved to be quite satisfactory. The students take it as a serious matter, and the scheme works smoothly. It does happen, of course, that all the faults are not detected by the checker (even the best students are not infallible) but these are discovered by the instructor in the final checking. The checker is then informed of the faults and he, in turn, informs the student who made the drawing. Occasionally, of course, there are disagreements between the checker and the maker of the drawing, but the discussions which ensue are good instructional devices, as in many cases textbooks and handbooks must be consulted for verification before the instructor may be called upon to settle the controversy.

Learning the Type Case

Kenyon S. Fletcher*

WHEN the student enters the printshop for the first time, he is anxious to start actual handwork and his interest is stimulated considerably if he can combine typesetting with learning the case.

The following procedure has been used in the writer's classes with satisfactory results. A type stand, type case, and composing stick is assigned to each member of the class on the first day of their appearance in the printshop. Just as soon as the students know their places and tools, a demonstration on holding the stick and picking type is given. The students then set their sticks to some short measure — say 13 picas — and set up a line of any single character. When this work has been checked individually, the type is dumped back into the case.

At this time attention is called to the various-sized boxes and the amounts of type contained in them. Questions are asked to build up interest. Almost always the class will agree that the article *the* is the most commonly used word. The location of the three boxes, *t*, *h*, and *e*, is then shown on a sketch of a blank case on the blackboard. The three boxes are not marked on this sketch, however. Then each student sets a line of the word, using 3-to-em spaces between the words. When the last student has completed his line and each pupil's work has been checked, the type is distributed, one letter at a time, beginning with the *e*. The closeness of the three boxes to each other is noted and attention is called to the convenience of their proximity.

With this as a starting point it is easy to set other words which use the same letters with one additional letter. The word *that* used the new letter *a*. Its location is pointed out on the blackboard chart and the class sets this word as it did the first word, the work being checked individually.

The word *than* brings in another new letter. The *t* and *h* are being used for the third time while the *a* is being repeated.

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The accompanying list of words carries out this idea through the entire alphabet. In three instances two new letters are introduced together. This is because they are so often used together.

1. the	t-h-e	12. this	i-s
2. that	a	13. foolish	f
3. than	n	14. young	y
4. and	d	15. rush	r
5. done	o	16. wish	w
6. taught	u-g	17. part	p
7. caught	c	18. quick	q-k
8. bought	b	19. jack	j
9. could	l	20. exercise	x
10. love	v	21. size	z
11. move	m		

After *bought* has been set the students are asked to point out the first five letters of the alphabet. Of course, it is noticed that the last four are in alphabetical order. The same is done after *love*, the letters *t*, *u*, and *v* being in rotation, although in the reverse order. Also after *move* attention is called to the arrangement of the *l*, *m*, and *n*.

The age and grade of the pupils will determine the number of boxes that can be learned in a given period. If the lesson is to be divided into parts, which it usually is, it is convenient to end the first day's work with the word *move*. At this point the students know all the large boxes in the left side of the case and three in the center portion. When the class reports again, the boxes are pointed out on the blackboard chart and the class names the letters that belong in them. After this review, additional information on holding the stick, reading type, and a demonstration on distribution is given, and then the remainder of the lower case is learned. The same procedure as was used in the previous lesson is followed, except that the type is distributed from the stick one word at a time.

When the problem of distribution is introduced in this manner, much of the tediousness which usually accompanies

distributing is done away with. Since only one line is distributed at a time, the students do not think it is a big task; and because the line is a repetition of the same word, speed is easily acquired. This lesson in distribution is very helpful because it paves the way for the "throwing in" of whole jobs. Then, too, the class readily notices that distributing in the correct manner requires only one fourth the time taken to set up the same material.

A further lesson is taught in which the location of the ligatures is learned. The cap case is learned through use in setting exercises in which titles are set from the upper case.

After the third day at the case the class is examined by making each member fill out the usual blank case chart, the time required being recorded accurately and the tests being graded on the time basis. Time tests are also given on words and sentences. These tests are given over a period of a week's time after the case has been learned. The grading is purely objective because one point is scored for each correctly set word and two points are deducted for each error. The heavy penalty for errors is helpful because it makes the students realize the necessity for accurate distribution and the value of "reading the stick." The test lines are graded from proofs pulled from the type in the sticks, all of the proofs being made at one time. The test exercises are always self-justifying and students who do not finish the test in time are given an opportunity to quad out their lines. These short daily tests for speed and accuracy seem to have a stimulating effect on the class and create a spirit of competition which lasts throughout the term.

Test sentences such as *The quick brown fox jumped over the lazy dog,* in which appear all the letters of the alphabet, are used when the class knows the case thoroughly. The sentence *Offer the afflicted florist a fine office,* also is used because it makes use of each of the ligatures.

This method of teaching the type case is quite similar to the method used in teaching the typewriter keyboard. It tends to aid retention through association of words with the type boxes rather than to make the case a difficult memory feat. This method also builds up interest very quickly and motivates the problem of learning the case.

As She's Spoke

*Allen D. Backus**

HORACE started teaching when the new vocational school was opened. In one sense he hadn't a lot of education, for when he finished the eighth grade, home conditions made a job necessary. Horace started out in a woodworking shop and made good; nothing escaped him, and he wasn't afraid to ask questions. He learned a lot in eight years and in this sense was well educated.

We sometimes hear about natural born teachers; well, Horace must have been one, for his success in the vocational school was nothing short of phenomenal. The boys rated him ace high, and those superior beings who were supposed to judge his work couldn't see a thing to find fault with. In fact, his reputation spread through the school system to such an extent that when the beautiful new high school opened the principal insisted on having Horace in the woodworking department. It was a real promotion, and everybody was genuinely glad to see that Horace was the one who got it.

Every Thursday morning an assembly was held for the entire high school. Each instructor was asked to talk about his work, explain it, and point out wherein it was worth while. Now, Horace believed in manual training and had a lot of good forceful reasons as to why it should be a part of the school curriculum. He was so enthusiastic that he really looked forward to getting up there in the auditorium and telling them all about it. After he had listened to the Latin teacher trying to arouse some enthusiasm for the study of that dead language, and had smiled to himself as the mathematics instructor tried to kid everyone into believing that algebra, geometry, and trigonometry were the most important things in the whole educational world, he was just rearing to go.

It really wasn't quite fair, for even if the algebra and Latin teachers didn't prove the importance of their subjects, they made good speeches. On the other hand, Horace had some rattling good arguments, but as the English teacher said afterward, "Wow! but how he murdered the English language." "Aints" were as thick as flies on a kitchen screen door, and "it" was generally followed by "don't," while the high school everybody was so proud of was nothing but "this 'ere high school." It was really rather ghastly, and as we said before not quite fair, for no one had ever told Horace that he was making many of these mistakes every day, and consequently he didn't realize it at all.

No it wasn't the least bit fair, for Horace was actually one of the most valuable teachers in the school; he knew his subject matter and kept his shop and equipment in fine shape, and when a boy needed advice or help he beat it hotfoot to Horace and got what he went after. But after Horace spoke in the assembly the highbrows put Horace and shopmen as a group in a class by themselves somewhere down the scale. No it wasn't fair. Sometime during all those years Horace had been teaching, some person in a supervisory position should have been brave enough and wise enough to point out to Horace the fact that his English wasn't one hundred per cent. To be a good teacher was Horace's one ambition and he would have got busy P. D. Q.

Boys are not critical of the grammar you use, and there is something about the shop environment which makes it easy to slip into careless ways. Take stock frequently and see if you are slipping; even ask the principal to observe your teaching and check on your English. In any case, take an extension course in public speaking. You'll be surprised at the results. We guarantee you'll be a better manual-training teacher.

Don't give the highbrows an opportunity to classify shop teachers.

*Director of Manual Training, Newark, N. J.

INDUSTRIAL ARTS and VOCATIONAL EDUCATION

J. J. Metz, Editor

EDUCATION MADE AVAILABLE

At the convention of the Advertising Federation of America which was held recently, one of the speakers stated that the answers obtained from 33 college graduates who held executive positions in one of America's largest department stores showed that 21 had taken cultural courses at college, while 12 had confined their studies to vocational courses. The further question, what, if any, changes they would make if they had an opportunity to take their training over again, elicited the surprising replies from the 21 who had taken cultural courses, that they would certainly include vocational subjects if they were to take their college work over again, while those who had taken vocational work at college deplored the fact that they had not taken cultural subjects instead.

No doubt, each man felt that he had missed something in his training that the other man had obtained. It is merely an example of the prevalent idea that "the greenest grass is to be found in the pasture beyond the fence." Such regrets ought not trouble anyone in this day and age, however. To the ambitious man, be he 20 or 70 years of age, there are all kinds of educational opportunities open. The programs of evening schools in the larger cities offer a bewildering array of vocational and cultural courses, and he who lacks either, needs but to choose and avail himself of the opportunities that are presented to him. The ambitious man or woman in the smaller cities has not been forgotten either. Many of the larger universities, besides numerous private schools, are offering extension courses which can be taken at home, and for which in some cases college credit is given.

Schools offering industrial-arts and vocational subjects have been in the vanguard in extending these opportunities to those who might need them. The present conditions have made it necessary for men to quickly change from one type of work to another. Men who have had academic training which fitted them admirably for some types of work, had to adapt themselves to jobs in which manual and technical training were needed. Others who had been engaged at one type of manual labor had to change over to work of quite a different nature.

Some people are adaptable enough to succeed in adjusting themselves under such circumstances; others need assistance in preparing themselves for new employment. The experiment made at New York, where two continuation schools were opened during the summer months for educating unemployed adults, has been quite successful. The opportunities which were offered by these schools were grasped by many who were anxious to extend their knowledge of their own trade or to acquire skill in some occupation. This experiment should be extended. There are many cities where the same thing might be tried advantageously. It would give numerous unfortunates who, through their own fault or because of circumstances, have become misfits, an opportunity to get training which would enable them to adjust themselves to conditions as they now exist.

Shop teachers, too, should not fail to avail themselves of educational opportunities that are open to them. At the present time, at least a bachelor's degree is required in many cities before a candidate can secure a position as shop teacher in a high school. Other shop teachers in these systems who are permitted to continue because they were incumbents of teaching positions before present admission standards were adopted, should not be satisfied to rest on their laurels but at once begin to take evening- and summer-school work until they, too, have earned the coveted degree which spells greater opportunities for personal advancement, and a raising of professional attainments in the shop teaching corps of their community.

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VOCATIONAL EDUCATION ON THE INCREASE

It is interesting to note that the present depression has not curtailed the state appropriations made for vocational education. This is especially remarkable because every effort has been made to cut down the governmental expenses in most other departments.

According to Dr. J. C. Wright, director of the Federal Board for Vocational Education, this increase amounts to a total of $750,000 in the 46 states that have reported. Nineteen of the states report an increase in state appropriations, totaling $800,000; seven report decreases amounting to $70,000.

It is equally encouraging that local communities take the same viewpoint as the state organizations, and that, on the whole, the appropriations for vocational education and vocational rehabilitation show a decided upward trend.

Among the states, New York takes the lead with an increase of $300,000 over last year's appropriation which will be used in introducing 15 new departments of vocational agriculture and in further expansion.

In 42 out of the 46 states reporting, every indication points to an increase in enrollment in vocational classes, while four states report that the enrollment will probably be about the same as for the previous year.

These signs are decidedly hopeful because if the depression has accomplished anything, it has demonstrated the bad effects of the narrow specialization that has made such big strides in many trades.

It is true, our present-day manufacturing methods do require the specialist. It is equally true, however, that the training of the specialist may and should have quite a broad trade foundation.

The man who is a capable lathe hand, for instance, may also be a good all-round mechanic. The broader training does not preclude the application of the learner's knowledge to a narrow specialty. It does, however, give him several other choices, should the work in the specialty of his first choice dwindle down to nothing. Furthermore, a worker who has demonstrated his ability in one department of a manufacturing establishment is quite sure of being given a chance in other divisions of the plant if he is able to do the required work. Broad trade training, therefore, prepares the worker to more readily adjust himself to the flurries and fluctuations which are so prevalent in some industries.

Naturally, all those interested in vocational education feel quite elated over the fact that their particular activity is not hampered by the appropriation cutting which the times make advisable in other governmental activities. However, this very fact also imposes a serious duty on all vocational teachers to earnestly strive for the improvement of their work so that the trust placed in them is fully justified.

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THE RIGHT KIND OF START

Just as a race is largely dependent on the manner in which the runner makes his "get-away," so much of the shop teacher's success during the year depends on the opening day and on the way in which he conducts his shop during the first week or two of the school year.

It is especially at this time that the teacher must be on the lookout if he wants to retain the ultimate management of his classes in his own hands. Naturally, at this stage, he is not quite sure of the personalities of his students. He must study each one individually because each one will require individual attention. While he is making his analyses of the boys, he must not forget that each boy also is making a private estimate of the teacher, carefully appraising each and every move, and mentally cataloging his findings for future reference. Any false move, any show of weakness at this time, therefore, must be carefully avoided. The teacher must be especially on the alert to win the good will of his students. Hence, while he must hold the reins firmly, he must not hold them too tightly, or too nervously jerky to make them irksome. His own work naturally will be reflected in that of his students. Unless he has his objectives clearly in mind, his opening statements clearly and logically arranged, and his demonstrations so carefully prepared that he can go through with them faultlessly, he will soon be at a disadvantage with his students.

If the boys are to learn orderly planning, they must do so from the teacher. He must himself be an example to his students in using the method of orderly planning. Its advantages must become apparent to his classes, not so much by what he says, but by what he does, and how he does it.

His directions, too, must be explicit and to the point. His language must be correct. It is only under such conditions that he can expect the work of his students, which must be reflections of his own work, to come up to the standards which he has set for them. In a like manner, their reactions in class will be modeled after his own actions. If he is calm, systematic, businesslike, he may expect his boys to react in the same manner. On the other hand, if he is nervous, excitable, and temperamental, he must not expect his pupils to act differently.

The first few class meetings, therefore, are exceedingly valuable, for in them is laid the foundation upon which depends the failure or success of the work for that semester.

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RECORDS AND REPORTS

"I wonder whether I was engaged as a teacher or as a bookkeeper" has been the plaint of more than one teacher when confronted with the task of filling in one or more of the numerous records and reports that are now part and parcel of the educational system. This recordkeeping, tiresome and troublesome as it may seem, is however, a vital factor in making industrial-arts and vocational work effective.

Of course, records must justify their existence. They must satisfy some real purpose, and the teacher who is confronted with gathering the data must know the purpose for which they are collected.

Reports and records, to be of any use, must be carefully and conscientiously kept. Unless this is done, they may lead to erroneous conclusions. Ordinarily, the teacher himself is interested only in those records which he himself can use. However, there are other records, equally important, which must be kept for administrative purposes and which may take much time and effort to gather. A little thought and planning may establish a routine method which will enable the teacher to relieve himself of some of this work by allowing students to take care of part or all of the job. In each case, however, the instructor should be sure that he himself knows for what purpose the records are to be kept so that he can properly supervise the recording and reporting of them.

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RESOLUTIONS

With the beginning of the new school year there are a few definite jobs that every shop teacher ought to resolve to take care of, if he has not already done so. They may entail considerable work, yet they are professional duties that ought not to be slighted.

These jobs include the following:

1. Definite objectives for his shopwork.
2. A precise outline of instruction.
3. Whole-hearted support to further the undertaking of the study made by the A.V.A. Committee on Standards.

Vocational Building-Trades Work

*W. E. Durbahn**

QUITE a large number of the students who attend the Deerfield-Shields Township High School, Highland Park, Illinois, are preparing for college entrance. However, a certain percentage of the students, as in all communities, will never go to college. Both Highland Park and Lake Forest, from which the students of the school are recruited, are essentially residential in character, all factories being prohibited by the zoning regulations. Building construction, therefore, occupies a prominent position in the industries of the two towns. Hence, to those boys who are mechanically inclined and who are not preparing for college, the building trades offer the best opportunities.

About eight years ago R. W. Schneider, director of industrial and vocational education at the Deerfield-Shields High School, sent out questionnaires to former graduates of the manual-training department to find out what vocations they were following. They were asked what trade courses would have been of special help to them while attending school, and what they would recommend the school to offer in the way of such courses. The answers to these questionnaires showed that the building trades ranked first with carpentry leading, followed by electrical work, bricklaying, plumbing, etc. Thereupon, the building-trades course was organized under the plan outlined by the Smith-Hughes Act. The work for the student was laid out in such a way that half of the school day was spent in the classroom studying such subjects as social science, English, drawing, mathematics, and science, and the other half day was spent in practical building-trades work. The immediate objective of the department is threefold: First, to provide a basis for the vocational choice and training; second, to prepare the student for advantageous entrance and successful participation in the building trades as a means of earning a livelihood; and third, to develop responsible and efficient citizens. The course in the building trades offers experience to boys in all the trades represented in the construction of a dwelling, especial emphasis being laid on carpentry.

The aim of the first year's trade work is to acquire preliminary knowledge of and skill in the performance of the fundamental processes of carpentry, bricklaying, plumbing, concrete work, electric house wiring, and painting. The aim of the second year is to develop appreciation and ability in production, accuracy, neatness and speed in the trade he chooses to follow. In the third and last year the aims are to afford experience in leadership, by having the student participate in the management of the shop, take charge of a group, and be responsible for a certain section of a building under construction.

Although the high school is organized under the four-year plan, the building-trades work is considered a three-year course. The ninth-grade students are encouraged to take the regular academic course; exceptions are made for students who are 16 years of age and who insist on taking the trade work.

It is impossible for one instructor to give the boys real trade experience in all the trades represented in the construction of a building, and to assist him, journeymen in the various trades are employed at times. These journeymen, who each represent a particular trade, come in and work with the boys while their particular trade-work is in progress. Up to the present time the boys have worked at all the trades except plastering; all plastering on the buildings thus far has been let to local contractors.

The usual procedure is to purchase a lot in the spring of the year. Then the type of house suitable for the location is decided upon. All boys in the department are given an opportunity to work out plans for the house. These plans are then carefully studied and the best ideas represented in the various layouts are adopted and combined. To the best draftsmen is assigned the task of making the drawings for the building which will be erected the following year. Before the school is dismissed for the summer vacation the lot is carefully surveyed by the boys and the building staked out, ready for excavation. The portable field shop is moved to the new location, erected, and everything arranged in readiness for building operations to start when school opens in the fall. During the summer contracts for the excavation, sewer, and water service are let so that the work will be completed when school opens.

The students in the building-trades department (28 at the present time) are organized into four sections. Two sections are on the building job in the forenoon and two sections in the afternoon. The two sections that are in the academic work are rotated so that they get the necessary related work during the three-hour session in the five-day week.

The construction work is conducted so that each student has an opportunity to select the trade in which he is most interested. All beginners must pass through two weeks of preliminary work offered in the six leading building trades. This preliminary work is given just previous to starting the particular trade work on the building; it will help the student to make his initial trade choice and also give him the fundamental principles of the trade.

To carry on the construction work, groups are organized, consisting of from three to five students, and

*In charge of building construction, Deerfield-Shields Township High School, Highland Park, Illinois.

Fig. 1 shows the house built during the school year 1925–26.
Fig. 2 was the project finished during the school year 1926–27.
Fig. 3 is a picture of the 60 by 80-ft. auto-mechanics building which was erected on the high-school grounds during the school year 1927–28.
Fig. 4 shows the house built in 1928–29. It was sold for $16,000.
Fig. 5 sold for $13,500. It was built during the school year 1929–30 and received honorable mention by the Better Home of America organization from Washington, D. C.
Fig. 6 shows the house which was completed in May, 1931. It was opened for inspection for 4 days and over 2,000 people visited it during the exhibit. This house received the first prize in the Boy-Built House class from the Better Homes of America organization.

each group is in charge of a student foreman who has had previous experience. Wherever possible, each group is given a definite section of the building on which to work, and they are held responsible for the results. All students work on the erection of the forms and the pouring of the concrete for the foundation of the building.

Other trades, such as bricklaying, plumbing, and painting, are started as soon as the building is ready for them, and then each student can follow his particular trade choice.

The individual instruction method is followed through the use of instruction units, consisting of informational exercise, information and operation units. Each student, before he begins a new operation, studies and works out the instruction material in the field shop where tables and benches are provided. Wherever all students are concerned, a general class demonstration is given by the instructor, but as a rule the instructor works with the individual or small group.

As stated in the foregoing, the building operations begin when school opens in the fall. By the latter part of November the buildings usually are inclosed, and the heating plant installed. During the winter months

the students have comfortable working conditions in the building and on warm days do the necessary outside work, so that by the middle of May the building is completed and ready for the public exhibition.

To be a tradesman the student must not only get trade experience, but he must also be able to read, understand what he reads, and express himself intelligently. This training is given while he studies in civics, English, and history. All of this work is closely correlated with the practical work on the job. Reports are written of the projects undertaken, particular processes or tasks are explained, and field trips are taken. This is supplemented by reports on subjects investigated in trade journals and industrial reference books.

Then, too, the mechanic must be able to draw, read blue prints, make mathematical computations, and have some understanding of the science connected with the trade. This is taken up in the drafting room where the boys work out the plans for the buildings which are to be erected, estimate the materials, their cost and quantity, learn to use construction handbooks and the tables that are found in these books.

The related work is also carried on by the individual instruction method, each student progressing at his own rate of speed. For the individual who is a capable and rapid worker, the program is enriched, thus keeping his interest and broadening his trade knowledge.

The vocational building-trades work at Deerfield-Shields High School is carried on purely for practical education values. No building has ever been erected for any individual. After the building has been completed it is placed on sale to the highest bidder. The school therefore can carry out its educational program by using the practices which give the greatest amount of educational value.

The quality of the work can best be judged by the fact that all houses have been sold readily, one for as high as $16,000. After the student has completed three years of work offered in this course he has usually found the particular building trade for which he is best fitted, and has laid the foundation for the trade which he expects to follow throughout life.

A Measuring Stick for Coordinators

*William A. Hemmer**

THE list of characteristics of a good coördinator which follow, may be used by coördinators as a self-measuring device, to see how well they stand in their own profession.

A good coördinator —

1. Has good health.
2. Is always on the job.
3. Is friendly.
4. Is human.
5. Has patience.
6. Has maturity of judgment, and a personality which commands respect and invites confidence.
7. Is careful of his personal habits.
8. Has a broad, liberal education and a successful classroom experience which can be expressed in terms of life's problems.
9. Has ability to interpret educational measurements and psychological tests.
10. Understands his own functions in relation to the functions of employment managers.
11. Is a good interviewer.
12. Has ability to formulate and execute policies.
13. Has ability to create the right attitude in children.
14. Has ability to meet the needs of the individual child.
15. Has ability to bring out the best in the individual — intellectually, socially, and morally.
16. Has ability to meet the issue of truancy.
17. Has ability to do teamwork.
18. Has ability to make outside contacts.
19. Is a good advertiser.
20. Has courage to face criticism.
21. Possesses inspirational leadership.
22. Has comprehensive view of educational and occupational field.
23. Has ability to evaluate the occupational value of education.
24. Has administrative ability with vision and power to group large educational and social issues.
25. Possesses organizing and executive ability.
26. Has administrative ability and training for problems of organization and administration.
27. Has understanding of practical problems involved in supervision and leadership of boys and girls.
28. Is a factor in creating public opinion.

*Director of Part-Time School, Saginaw, Michigan.

STOOLS WITH SHALLOW CARVING, TURNED LEGS, AND STRETCHERS
Submitted by Herman Hjorth, Yonkers, New York

Carrying Long Boards

When carrying long boards, hold them so that the forward end is above head level.

Walk slowly when approaching corners or doorways.

The boy at the left also should guard against rushing into trouble, otherwise he may get a painful bump, if not a severe injury, for his heedlessness.

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Submitted by Jos. J. Lukowitz, Milwaukee, Wis.

Driving Screws

If the screw driver slips, the boy at the left may get a bad gash in the wrist or fingers of his left hand. The left hand should not be placed ahead of the screw driver.

The boy at the right is trying to remove a burr from the head of the screw. He may get a steel sliver in his finger for his trouble.

Use the screw driver for scraping off these burrs if necessary.

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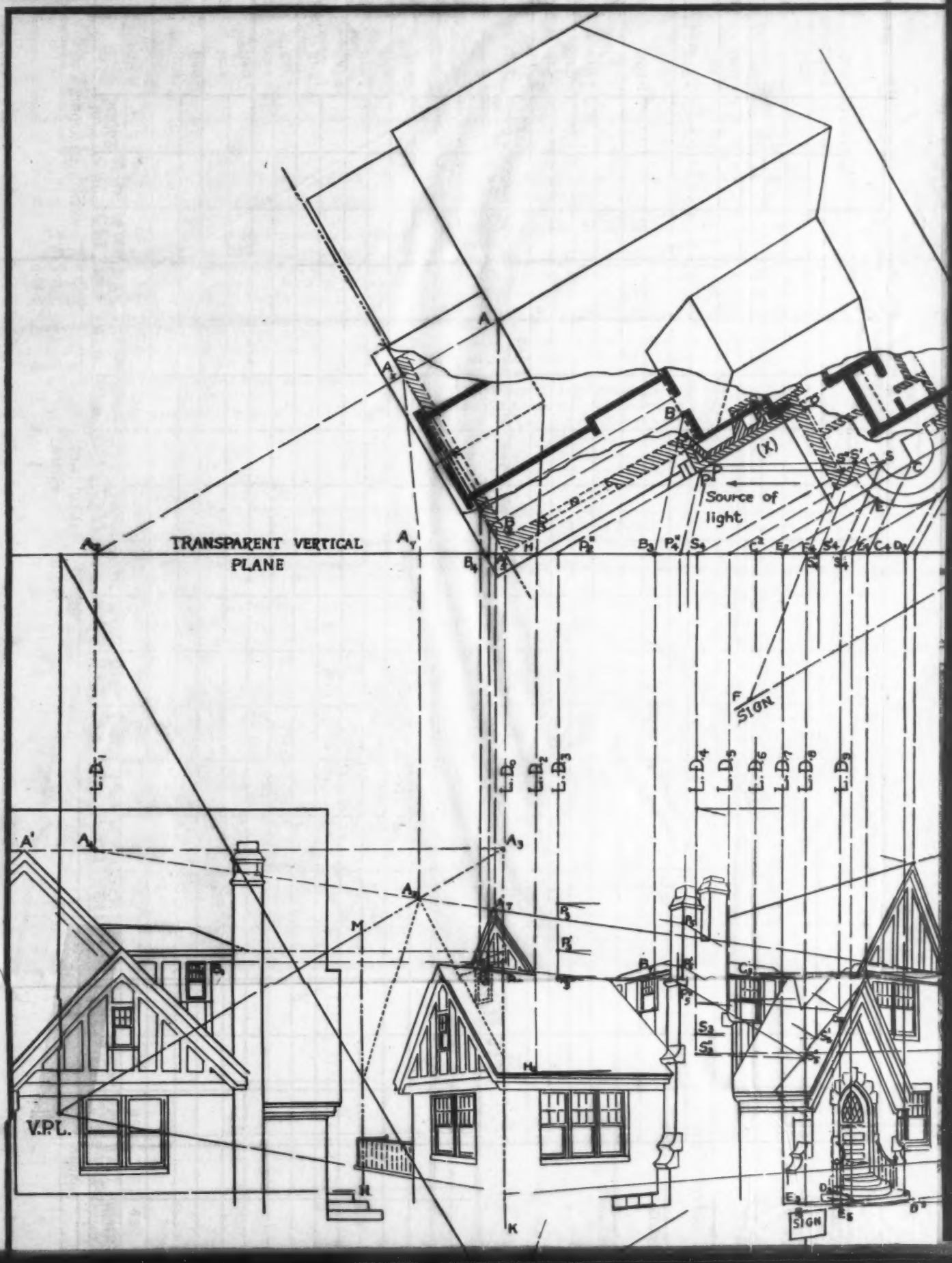
Submitted by Jos. J. Lukowitz, Milwaukee, Wis.


TRANSPARENT VERTICAL PLANE
Source of light
SIGN
V.P.L.
SIGN

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PERSPECTIVE DEVELOPMENT

By W. S. MORGENTHALER

This is a composite drawing for graphically illustrating a number of the varied problems encountered in making a perspective drawing.

LEGEND

1–STATION POINT is located 53 feet from house corner and 6 feet above first floor level.
2– First floor plan wall
3– Second floor plan wall
4– Object outline
5– Image outline
6– Construction line
7– Cutting plane
8–L.D.–Line of Direction (true length of vertical measurements)
9–P, P', P''–Points used in locating shadow points.
10–S, S, S''–Shadows of points P, P', P''.

PREPARATION OF PERSPECTIVE LAYOUT

1– If space permits it is best to have the perspective layout to include the elevation drawings as illustrated. If the elevations are too complicated or room does not permit, one elevation may be placed on top of the other making sure that the floor level of the top drawing is exactly above that of the lower drawing. If both are then fastened down securely along the top edge, the top drawing may be folded back so as to permit working from the lower one.

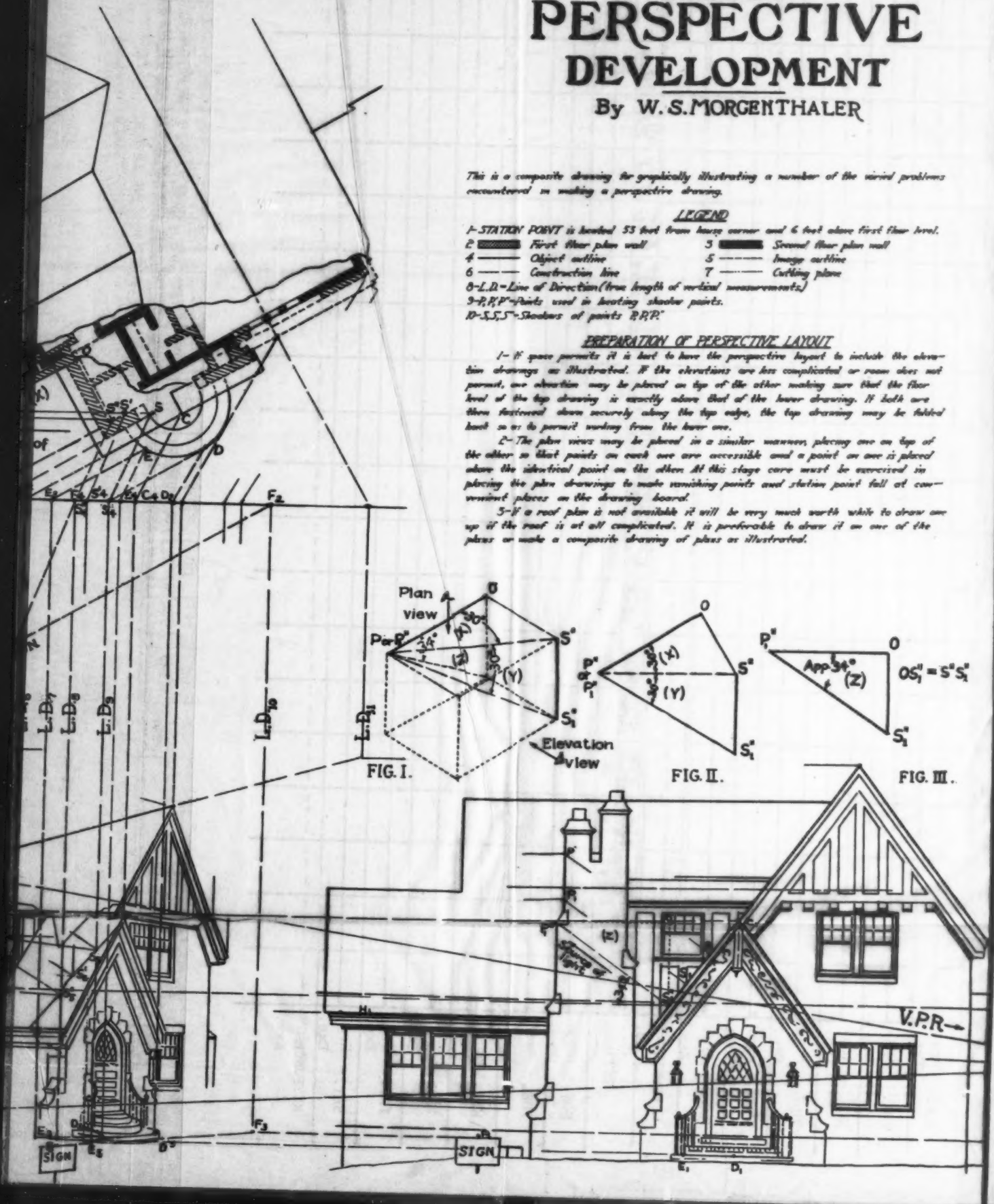
2– The plan views may be placed in a similar manner, placing one on top of the other so that points on each one are accessible and a point on one is placed above the identical point on the other. At this stage care must be exercised in placing the plan drawings to make vanishing points and station point fall at convenient places on the drawing board.

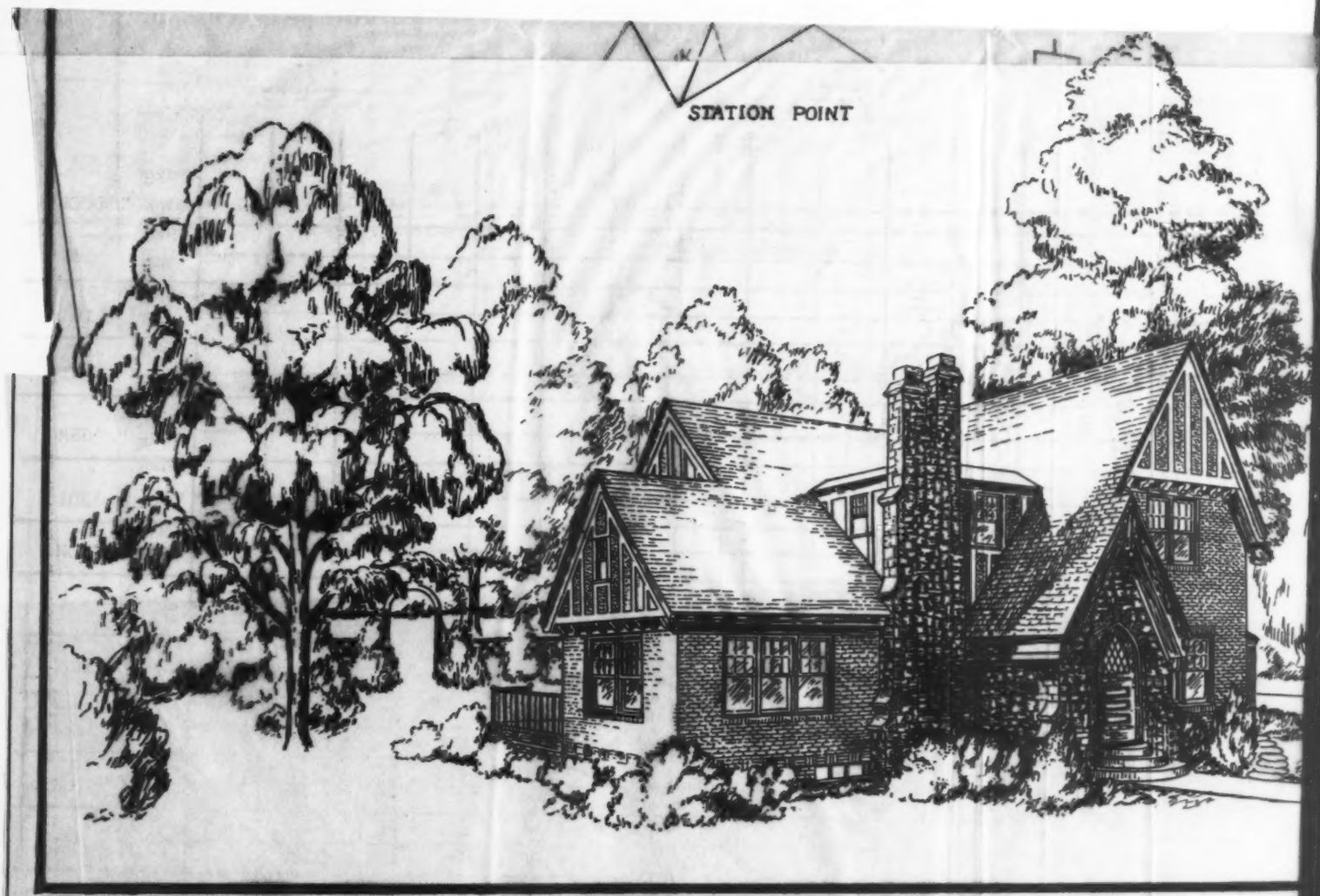
3– If a roof plan is not available it will be very much worth while to draw one up if the roof is at all complicated. It is preferable to draw it on one of the plans or make a composite drawing of plans as illustrated.

FIG. I.

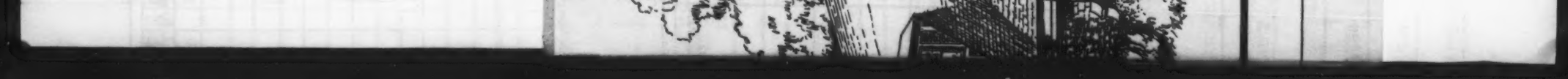
FIG. II.

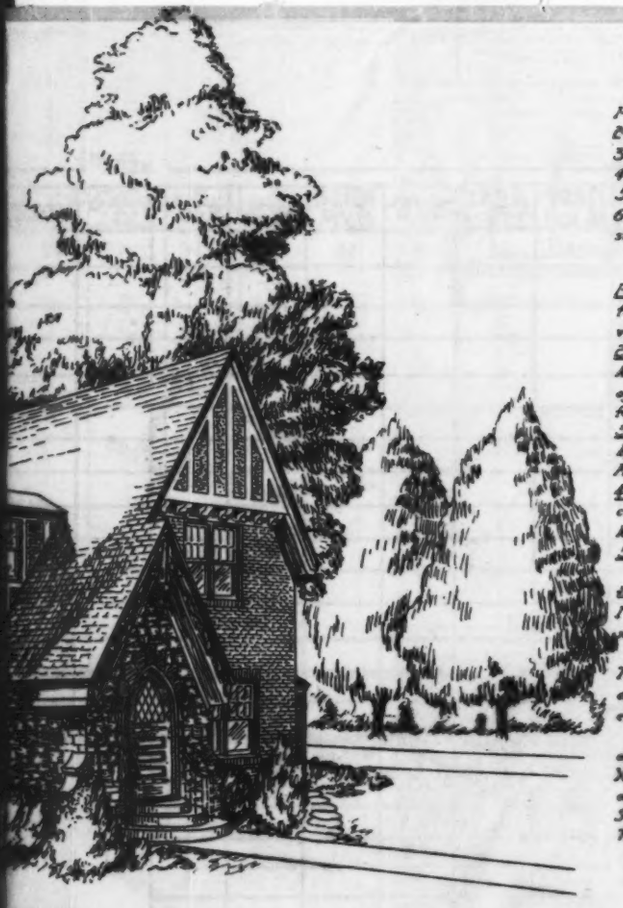
FIG. III.





Submitted by W. S. Morgenthaler, Des Moines, Iowa





GENERAL RULES FOR LOCATING POINTS ON PERSPECTIVE

1–Locate the same point on the plan view and on the elevation as C and Ce.
2–Project this point to Tr. V.P. as C to Ce and draw new L.D. as L.De.
3–Project this same point as found on the elevation to L.D. as Ce to L.De.
4–Project the point found on L.D. to V.P. as Ce to P.V.P.
5–Project the point on the plan view toward S.P., locating a point on Tr. V.P. as C to Ce.
6–To find the point wanted on perspective, project this point downward from Tr. V.P. until it strikes the line drawn toward V.P. as Ce to Cs.

POINT LOCATION BY SPECIAL METHOD

1–POINT NOMENCLATURE. Points are located on the perspective by traversing lettered points and following an ascending order of their index figures. Ar is located on the perspective in conventional fashion by traversing points A–Ae–Ao–Ar and A–As–Ar.

2–ALTERNATE OR CHECK METHOD. A method for checking the accuracy of the location of point Ar consists of traversing points A–Ax–Ay–Az–Ar and Ar.As–Ax–Ar. With this method the image of point A is first located on the cutting plane H'–As–H–H'. The perspective point Br is found by traversing points B–Be–Bo–Bu–Br, B–Bs–Br and Br–Bs–Bu–Br.

3–POINTS SITUATED BELOW TRANSPARENT VERTICAL FLAME LINE. This condition is illustrated by point F of the sign. Locate Fe so that it is in line with F and S.P. Traverse points F–Fe–Fo–Fs, Fo–Fo–F and Fr–Fs–F's.

4–PERSPECTIVE OF CIRCLES. Arbitrarily locate a series of points as D and E on the circle and locate the same points on the other view as Di and Ei. Proceed in normal fashion to locate Ds and Es.

5–SHADOWS. (a) Locate all points as P, P', P" on the plan view and points P, P', P" on the elevation.

(b) Star source of light on the plan view and note that the angle for source of light on the elevation will have to be found by combining right triangles X and Y as indicated by fig. I and II. Use any length as OP" as a base and find the altitude S"S' by method shown on fig. II.

(c) With the newly found altitude S"S' and the base OP" construct the right triangle Z. The angle SP"S' is approximately 34° and is the angle of the light ray P'—S' on the elevation. With the angle of the light ray now determined it's point of contact S' can now be established. Locate Ss and S'.

(d) Locate the shadow points S, S' and S" on plan by projection from points P, P' and P". The length of line P"–S" is found by using the newly found base OP" to construct right angle triangle X on the plan view. These rays of light form an angle of 30° with the front side of the house and are parallel to the transparent vertical plane as they fall directly from the left. The line P'S' is a foreshortened length of the light ray, as it falls at an angle of 30° from the horizontal plane. The line P'S' is very near the true length of the light ray.

(e) To find points Ss, S's and S"s proceed in normal fashion as for Cs.

PROBLEMS AND PROJECTS

PERSPECTIVE DEVELOPMENT

W. S. Morgenthaler, Lincoln High School, Des Moines, Iowa

(See Supplement No. 223)

This supplement on architectural perspective is designed for reference use or class study by pupils having had the elements of perspective. An attempt has been made to include all problems encountered in drawing a house in perspective, and making a visual analysis of each. To assist in the study of these problems the following questions are submitted:

1. What point serves as C.V. on this drawing?
2. What relation does C.V. hold to S.P. on a perspective drawing?
3. What is the relation of *line of direction* line ($L.D_0$) to the Tr. V.P. or *picture plane* (P.P.)?
4. Are vertical measurements taken at their full length on *line of direction* lines?
5. How does location of S.P. from Tr. V.P. affect the location of vanishing points?
6. With the plan view located on the board and S.P. in position, how are the *vanishing points* located?
7. Is there any relation between the location of the *picture line* and S.P.?
8. Is the *horizon line* found by measuring up from the *picture line* or from the *station point?*
9. Does the location of the *vanishing points* affect the size of the drawing on the sheet?
10. Does moving the plan view up from the Tr. *vertical plans* change the size of the perspective drawing?
11. Before proceeding to locate a point on a perspective drawing, is it necessary to first locate it on both the plan and elevation?
12. Is it necessary to draw the line $F\text{-}F_2$ for locating point F_5 on the perspective? Could $L.D._{10}$ be drawn elsewhere?
13. What steps must first be taken before finding perspective of shadow points?
14. In the architectural rendering of a perspective, is the showing of distance achieved by the use of light or heavy lines?

Answers to the Foregoing Questions on Perspective

1. A_5. This is the closest corner of the house wall.
2. Point C.V. is directly above S.P.
3. Line of direction lines are always perpendicular to Tr. V.P.
4. Yes. This is the line which represents the intersection of Tr. V.P. with the plane extended in which the vertical line is located.
5. The vanishing points become farther apart because the lines extending from S.P. are carried farther out before meeting Tr. V.P.
6. Lines are extended from S.P. to Tr. V.P., being drawn parallel to the plan view.
7. The P.L. is located so as to make the perspective drawing fall at the most convenient position (up and down) on the drawing paper.
8. The *horizon* line is found by measuring up from the *picture line.*
9. The location of the vanishing points on the sheet affect the size of the drawing slightly, the farther apart the V.P. is the larger the drawing. It affects the shape very materially in that it makes the object appear farther away.
10. Moving the plan view up from the Tr. V.P. makes the perspective smaller in size.
11. It is necessary to locate the identical point, on both the plan and elevation before attempting to find it, on the perspective.
12. It is necessary to draw the line $F\text{-}F_2$ in order to locate the line of direction line so as to get the correct height of point F_5 on the perspective. $L.D._{10}$ could be drawn at the left by making the line parallel to the other side (A_5 A_x) of the plan view.
13. Before finding the perspective of the shadow points as S, S′ and S″ the points, P,P′ and P″ must first be located on the plan and elevation as well as the shadow of these points. With the source of light coming from the left this involves combining the triangles as indicated and first locating the points on the plan and elevation drawing.
14. To indicate distance on a perspective drawing the use of light lines is usually resorted to with the heavier lines used to show objects closer to point of vision.

STARTING MOTORS USED AS FARM MOTORS

H. W. Paine, Associate Professor Vocational Education, The University of the City of Toledo, Toledo, Ohio

Many farm homes equipped with 32-volt farm lighting plants use electricity for lighting only on account of the almost prohibitive cost of motorizing the many different and widely distributed units needing power. For instance, there is a pump behind the barn, another one near the hog lot 300 ft. away; a cream separator in the milk house; a fanning mill in the granary; and a washing machine in the basement. If one motor could be used for all these machines, the cost would be within reason, but this would necessitate grouping the machines or moving the motor from place to place, either procedure being impractical.

This problem was successfully solved by salvaging several 12- and 18-volt starter generators at an automobile junk yard. They were purchased at two and three dollars each. The 18-volt starters were converted into pumping motors simply by equipping them with pulleys and connecting them to the 32-volt power lines. The shunt field was left open, the motor operating as a simple series motor. No resistance was used in the circuit as it was found that the resistance of the No. 8 copper wire in the power lines 200 to 400 ft. long was sufficient to keep the speed of the motors within reasonable limits. Figure 1 shows one of these motors that has been in use for two years, pumping all the water necessary for 100 hogs. Another similar motor has supplied 50 head of cattle and horses with water for a like period of time. These two motors have required no care or repairs except the replacement of brushes.

In using the 12-volt starting motors it was found necessary to insert some form of variable resistance in the circuit to protect the windings and to control the speed of the unit. Two different rheostats were experimented with, one consisting of coils of resistance wire connected to switch points through a controller lever; the other being a carbon dust-pressure box very simple of construction and extremely satisfactory to use. The writer is indebted to Mr. F. R. DeForest,

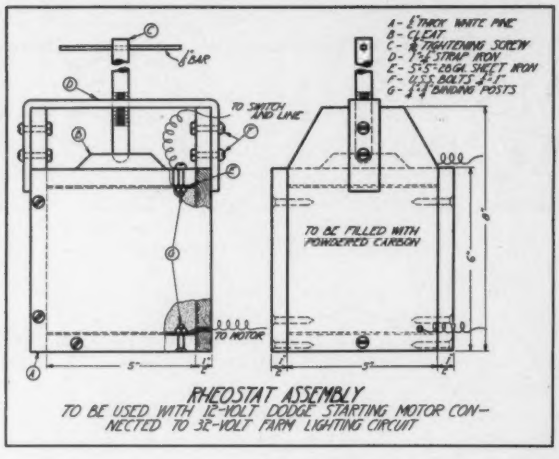

A- 5 THICK WHITE PINE
B- CLEAT
C- ¼ TIGHTENING SCREW
D- 1"x¼" STRAP IRON
E- 5"x5" 20GA. SHEET IRON
F- U.S.S. BOLTS ¼"x1"
G- ¼" BINDING POSTS
BAR
TO SWITCH AND LINE
TO BE FILLED WITH POWDERED CARBON
TO MOTOR
RHEOSTAT ASSEMBLY
TO BE USED WITH 12-VOLT DODGE STARTING MOTOR CONNECTED TO 32-VOLT FARM LIGHTING CIRCUIT

FIG. 2

science instructor at the Automotive Trades School at Cincinnati, Ohio, for this rheostat which is shown in Figure 2.

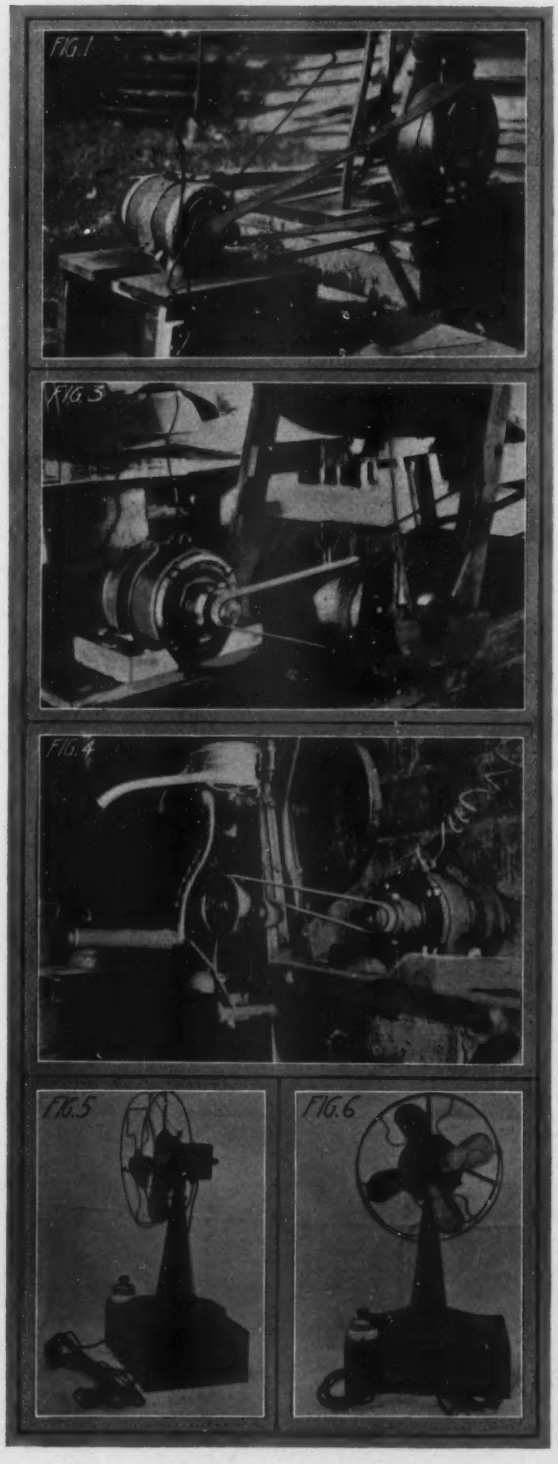
Its total cost is only a few cents since it consists of a wooden box A, 5 by 5 by 5 in. inside. This box is filled with powdered carbon secured by pulverizing old battery carbons. A metal plate with a wire leading from it is placed in the bottom of the box and a like plate E with a similar wire extending from it is attached to a movable cover in the top of the box. Means are provided to exert pressure on the cover of this box by the screw C which extends through yoke D. This resistance box is connected below the switch in one of the power lines leading to the motor. When the screw C is backed up so as not to exert any force on the cover, practically no current will flow through the powdered carbon, but as the pressure is increased, the particles of carbon are brought into closer contact with each other and more current is carried to the motor. Rheostats of this type have proved very satisfactory for controlling the washing-machine and cream-separator units shown in Figures 3 and 4. The control is sensitive and does not heat.

Another problem that presented itself in installing one of these motors was the necessity of reversing the rotation of the armature to avoid the necessity of using a crossed belt. This motor was a standard model G 12-volt North East Dodge starting motor. To accomplish the reversal of rotation, the short metal grounding strip extending from one terminal of the motor to the frame was removed and then the wires to the *main* brushes were reversed, i.e., switched from one brush to the other. These brushes may be identified as the two that cannot be moved by turning the regulating screw in the end of the starter frame. The third or movable brush, in this instance, is of no use as the motor is used as a series motor, leaving the shunt field brush out. The third brush could be removed, but since its presence does no damage, this is unnecessary. After removing the grounding strap and reversing the wires to the series field, the line wires were connected to the two brass terminals of the starter and the motor was ready for use.

The bases for these motors were made by beveling two pieces of 2 by 4's to receive the motor frame and nailing these strips across two other pieces of 2 by 4's, or across a 10 by 16-in. board. The iron strap used to hold the machine on the car was cut into pieces of the proper length and these were bolted to the two beveled pieces in such a manner that when the clamp bolt was in place, the motor would be drawn down tightly between the beveled 2 by 4's. Figure 3 shows this base construction plainly.

Pulleys for two of these motors were made by having a local garage mechanic weld pipe couplings over the chain sprockets with which these starters were equipped. Smaller pulleys for the other motors were made by grinding the teeth off these sprockets on an emery wheel and having a local machinist take a cut or two to crown them slightly. These sprockets are soft enough so that this can be done without difficulty.

A little time and ingenuity spent in fitting these motors to the different farm units will well repay anyone having a few tools and slight mechanical ability. Building the regulating rheostats and making the changes in the motors and building the mountings are excellent projects for Smith-Hughes vocational agricultural farm-shop classes. Usually such a class



will have several members who have 32-volt lighting plants at their farm homes.

One of the precautions to be observed in using these or any other motors in connection with farm lighting plants, is to avoid excessive drain on the battery. This may be guarded against by running the engine whenever the motors are used. This "floats the battery on the line" and the dynamo furnishes the current for the motors instead of the battery.

Another precaution to be considered is to guard the belts in such a manner that there is no possibility of their running off. Since these units are being operated as series motors, they have no fixed speed at no load and may damage themselves from excessive speed.

If the above simple precautions are observed, these discarded starting motors will furnish efficient, dependable, trouble-free power for years at an initial total cost of only two or three dollars per unit instead of the usual twenty-five or thirty dollars that would have to be paid for new farm motors.

Figures 5 and 6 show two views of an electric fan that was made from an old Dodge electric horn by rewinding the fields and placing some resistance that could be varied, in series with the fan in the wooden base. In this way a fan that would run at several speeds was produced. The fan blades and guards were bought at an electric shop for 25 cents and the stand which had belonged to an old electric heater was obtained at a cost of 15 cents. The switch and the cord really represented the largest investment in the entire construction.

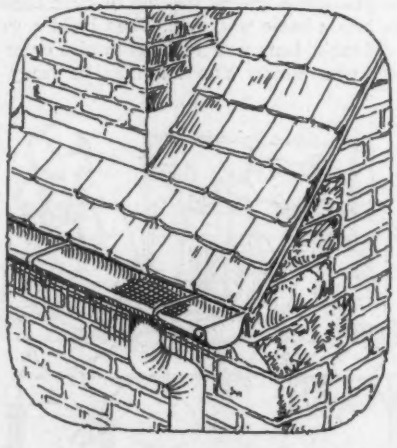
Jobs to be Done in October

J. H. Dillon, Junior High School, Bloomington, Indiana

Editor's Note: **While the jobs outlined here may have to be deferred until later in the season in some localities, nevertheless Mr. Dillon's method of making his school shopwork function in the home is worthy of emulation. He issues these bulletins (of which the one here shown is the second) in mimeographed form to his pupils. They act both as an incentive and as a reminder.**

Cleaning the Leaves out of the Gutter

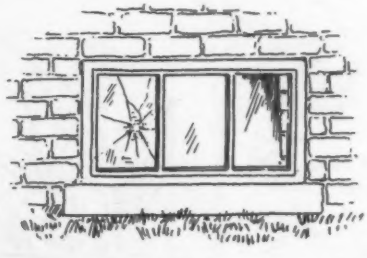
We cannot keep the leaves from falling but we can keep them cleaned out of the gutters and downspouts. Through this month and the next month this job should be done about



every two or three weeks. Leaves will lodge in the gutter and cause the water to run over the side or stand in the gutter and rust the metal. If the downspout is stopped up, the water cannot get to the cistern or to the natural drain. The gutters and downspouts should be kept clean at all times of the year. If a small piece of hardware cloth having about ½-in. mesh is fastened over the downspout opening, the leaves and sticks cannot get down in the pipes.

Weatherproofing Basement Windows

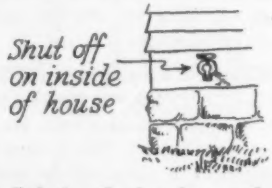
The basement windows should be closed and any cracks or openings sealed shut with rags or boards. Replace any broken



or cracked glass because it is better to repair it now than in the middle of winter. A cold basement makes a cold house.

Insulating the Water Hydrant or Shutting Off the Water

Some outside water hydrants have a shut-off valve in the basement or at some other place. Where one is provided it



should be shut off during the freezing weather in the winter. Other hydrants have no means of shutting off the water. Hydrants of this type should be insulated or protected against cold. A nail keg or other small keg tall enough to reach the

top of the hydrant and about 12 in. in diameter is good for this purpose. This keg should be filled with dry sawdust, old rags, or some other insulating material.

Caring for Your Sport Goods

Put away your baseball and glove. They have served you well through the summer, so care for them through the winter. Give them a coating of vaseline or leather dressing.

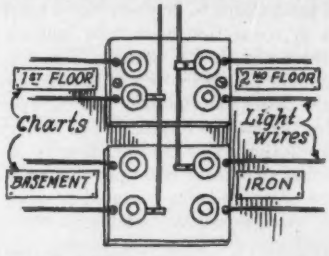
Put tennis rackets and balls away in a dry cold place. Get out and oil your gun, because the rabbits and ducks soon will be calling for you on Saturday and holidays. Don't take your gun out on the first hunting trip looking as if it had been buried.

Get your skates out and sharpen them. Repair and repaint your sled. Do not wait until the cold and snow comes before you get these articles in shape.

Making a Fuse Chart for Your Home

It is very convenient to have at the center of distribution or at the fuse box a chart showing what set of lights or devices each pair of fuses protect. This is very helpful in locating a blown fuse. Such a chart can be made by placing a light bulb on one side of the fuse box and noting that when one part of the circuit is turned on, the bulb will light up.

Label the block for that part of the house, such as the first floor, basement, etc. Check each block in this manner and label each as shown in the sketch. Be sure that the main switch is out when you remove and replace fuses.



Pruning out the Dead Limbs

Now is the time to cut out any dead or broken limbs from your trees or bushes. It is best to trim your trees now while the leaves are still on. It is easier to tell the dead limbs. The sketch shows how to remove a large limb. Always cut the limbs; never break them off. Be careful when climbing over

trees not to tear the bark. This gives a place for rot to start. A dead limb in a green tree looks like an old, dirty tie on a clean, well-dressed boy. The tree can't help itself; you must keep it looking healthy and attractive.

The Home Workshop

Get your tools collected and cleaned and oiled. On Saturdays, this winter, you will want a place to go and work and build toys, model airplanes, boats, etc. A corner in the basement, an attic, a spare room, a corner in the garage, and many other places are waiting for you to clean them up and make them into a home workshop. Then build a workbench or get an old table, hang your tools up in nice order and put a light over your bench. You will then be ready to start

developing a stepping-stone to your lifework or a hobby which is an enjoyable and profitable way of spending your leisure.

Hint. "Make dad or uncle a nice footstool for Christmas; then tell him that you need a new plane or saw for your workshop."

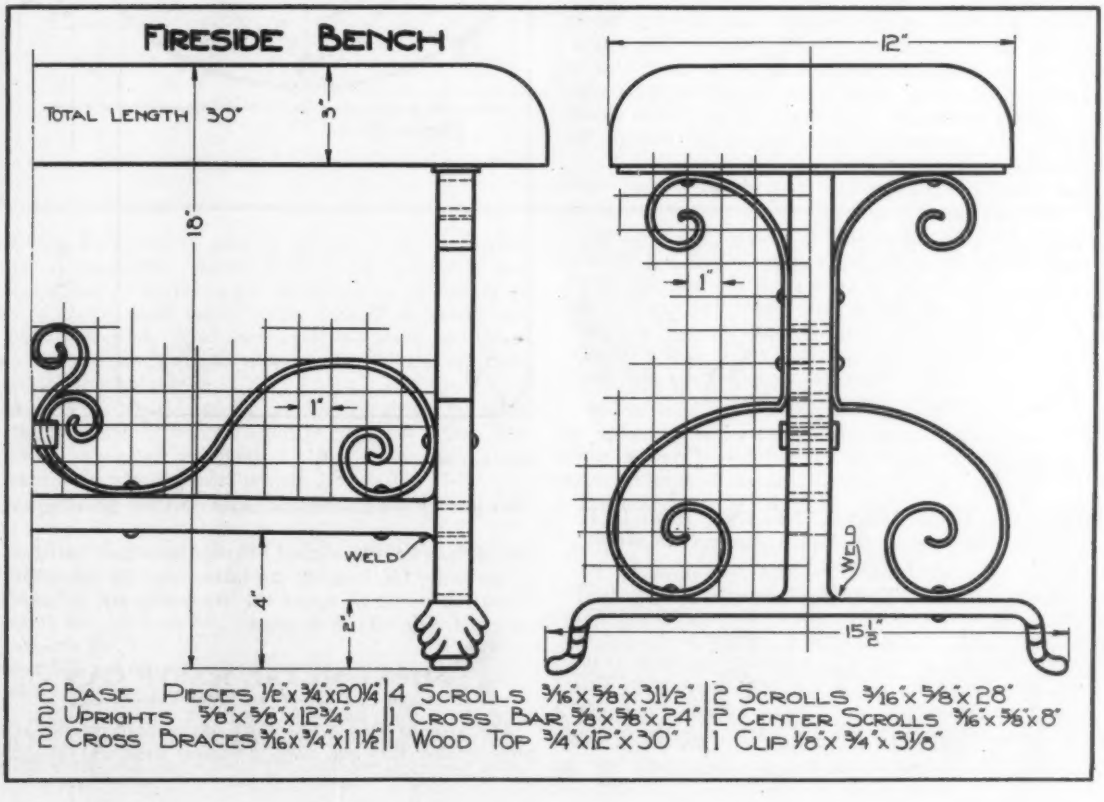
A FIRESIDE BENCH

J. W. Bollinger, Tulsa, Oklahoma

The bench illustrated herewith may be used either as a fireside bench, or as a radio bench. The project is well within the capabilities of the ninth-grade student.

The metal work on this project is given a hammered finish. To produce this finish, hammer each piece of iron, before it is curved or shaped, with the ball end of a machinist's hammer until the desired markings are obtained. After all the parts have been treated in this way, cut the base pieces and upset the ends. Spread them 1¼ in. in width and about 5/16 in. in thickness. Draw the design to be cut on the ends; saw, grind, and file the feet to shape. Make the bends over the anvil, and be sure both pieces are the same length and 2 in. high.

Cut the uprights and cross braces and assemble the pieces



cut thus far. For sturdy construction, the uprights should be welded to the base pieces. The cross braces to which the wood top is to be fastened may be bolted to the uprights with ¼-in. stove bolts.

Make a full-sized drawing of the scrolls for the ends on a piece of wrapping paper, using the squares as guide lines.

THE FIRESIDE BENCH

Shape the scrolls over scroll formers.[1] Rivet the scrolls to the upright, the base, and the crosspiece as shown.

Cut a piece for the cross bar.

Make a full-sized drawing of the scrolls for the cross bar, and shape the scrolls as before. A center scroll is riveted to each scroll with two countersunk rivets. The large scrolls are then riveted to the cross bar. The clip is put in place last and is used mostly for ornament. The cross-bar assembly may now be welded to the ends, and the scrolls riveted to the upright.

After all the metal parts have been assembled, coat them with a thin film of linseed oil, and then place the work over a gas furnace and burn off all the oil to produce a black surface. Then polish with emery cloth to brighten up the high lights. Rub the work with a rag soaked in lacquer thinner, and allow the thinner to dry on the iron. This step removes all grit and moisture and prevents rust. Apply two coats of clear (transparent) brushing lacquer to preserve the finish.

The board for the top is fastened to each end by means of four ¼-in. stove bolts which connect with the cross braces.

In order to produce a thick cushion, it is a good plan to glue and nail some 1-in. wood strips around the upper edge of the board. The edges of these strips and the corners should be rounded off considerably, so as not to cut through the upholstering.

Some pupils secured horsehair from old automobile cushions. This material was torn into shreds and piled high on the board. After placing a piece of a burlap bag over this, a board about the size of the top was laid on top and clamped down with hand clamps so as to press the horsehair down tight and also to press out the air. The burlap was then fastened to the 1-in. strips by means of carpet tacks. Then a sheet of cotton was placed over the burlap, and over this the outside cover was tacked. Three-quarter-inch gimp and fancy tacks were then used to complete the job.

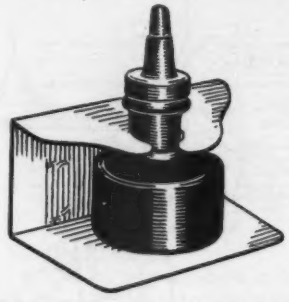
[1]How to shape scrolls over scroll formers and how to make a clip are described in *Elementary Wrought Iron* by J. W. Bollinger, The Bruce Publishing Company, Milwaukee, Wis.

HOLDER FOR DRAWING-INK BOTTLE

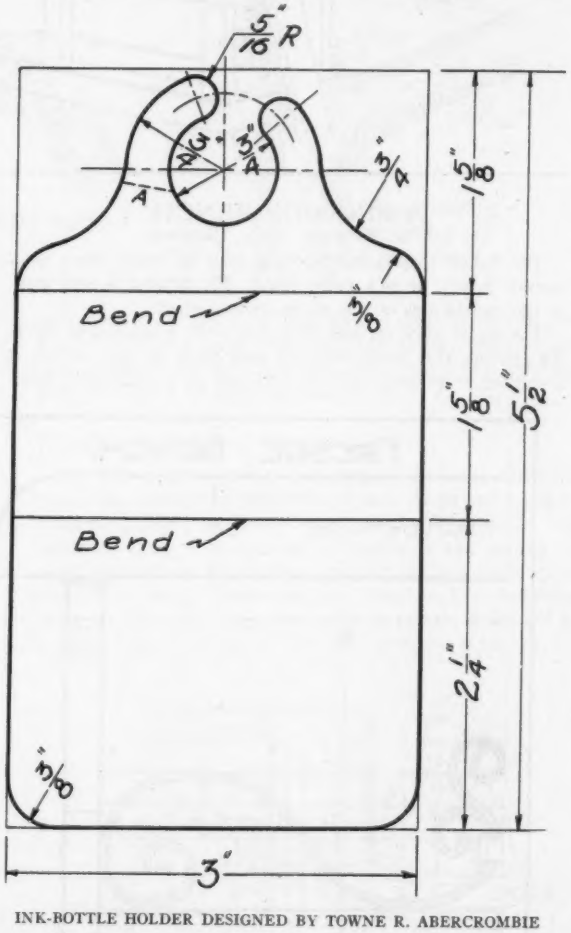
Towne R. Abercrombie, Washington Junior High School, Cincinnati, Ohio

There are many contrivances in use in drawing rooms throughout the country for the purpose of keeping the drawing-ink bottle right side up and in its proper place. The one shown herewith has proved to be a decided success. It is simple, yet very serviceable and is also very inexpensive. There have been no "casualties" as yet, simply because it is practically impossible to upset the ink bottle with the drawing tools or the elbows.

The illustration shows clearly how the holder should be laid out on the metal. A fairly heavy metal should be used



as this will insure keeping the holder in shape. Lay out the pattern on the metal and cut away unnecessary material. Bend on the lines indicated. To place the bottle in the holder bend back the tab A, insert the neck of the bottle, and bend



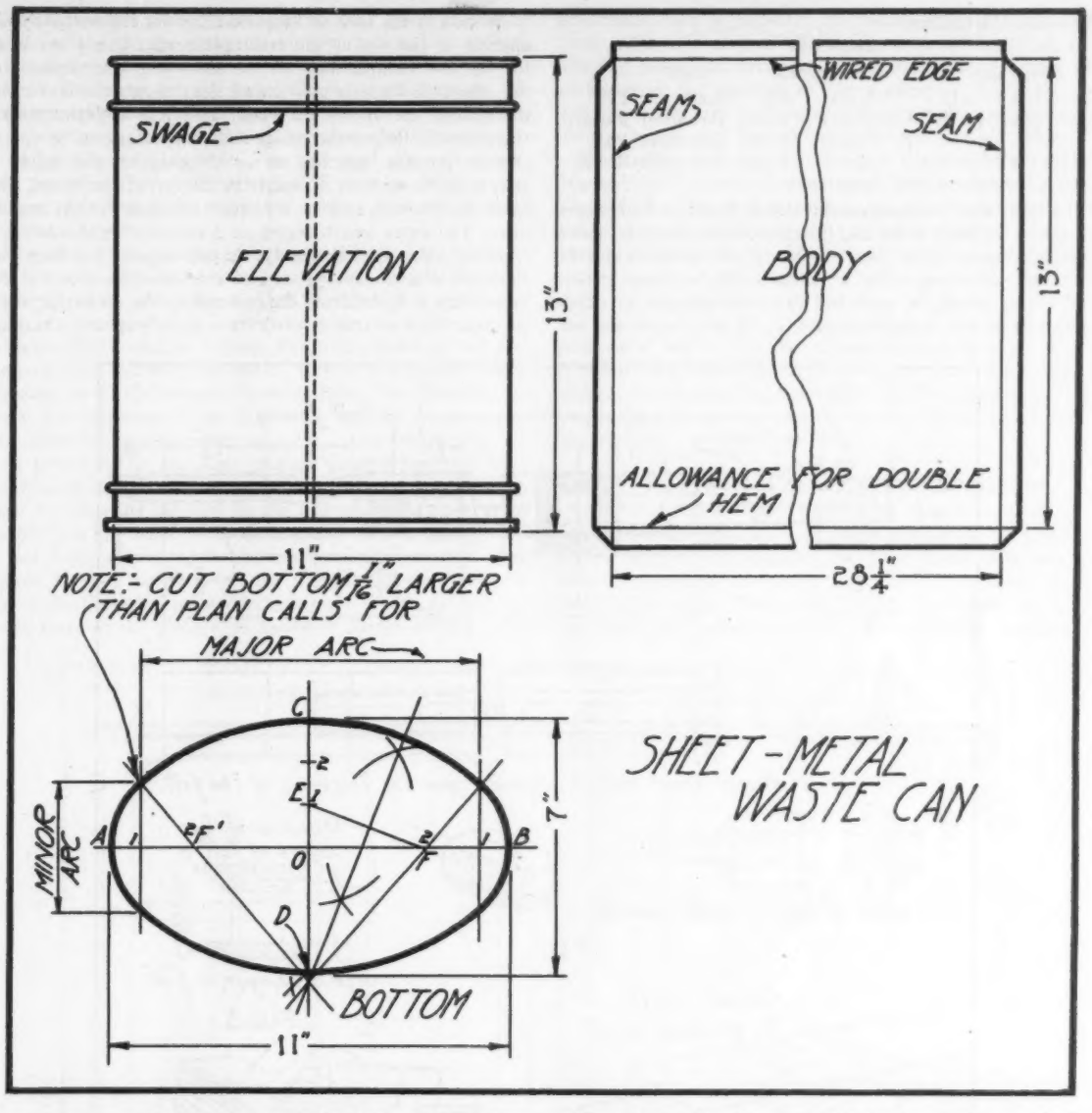
INK-BOTTLE HOLDER DESIGNED BY TOWNE R. ABERCROMBIE

the tab into its proper shape. If the bottle does not seem to fit perfectly, the back of the holder may be somewhat inclined and it will be found that the bottle will be perfectly tight and very difficult to upset.

SHEET-METAL WASTE CAN

Joseph E. Pierce, Glen Mills, Pennsylvania

This type of sheet-metal waste can is quite popular at the present time. They are made in various sizes, and the dimen-



sions may be varied to suit the desire of the user. After having determined the lengths of the major and minor axes of the ellipse, it is necessary to obtain the perimeter in order to cut the sheet metal for the body of the waste can. To do this, multiply ½ of the sum of the major and minor axes by *pi* and then make an allowance for the grooved seam or lap, as the case may be.

The can may be made of IX tin. The top should be wired and the bottom may be, but a double hem will suffice. The body may be seamed or lapped. A template for the bottom can be worked out as a class project.

The following method may be used for laying out the ellipse.

Let AB be the major axis, and CD the minor axis, CD being perpendicular to AB and intersecting at O.

Divide OC into three equal parts.

Step off two parts on AB, starting at B.

Draw line EF.

Bisect EF and extend bisector to CD extended.

Bisector will intersect CD at X.

XC is the radius for the major arcs, and point 2 which is F and F' are the points from which the minor arcs are struck. In other words, AF' and FB are the radii for the minor arcs.

The bottom should be cut 1/16 in. larger all around so as to fit the swage at the bottom. The beads or swages are placed to suit the instructor. The bottom is soldered in and the seam may be soldered, but this is not necessary if grooved.

When finished, it may be painted a suitable color and a transfer placed on the front. The wire edge and bottom hem may be given contrasting colors.

. Another good finish is to paint it a solid color, allow it to dry and then put on a coat of a contrasting color, and then mottle it with folded and crumpled newspaper allowing the undercoat to show through. Then apply the transfer.

The inside may be bronzed or gilded.

MUSICAL WHISTLE

C. Anthony Van Kammen, Grand Rapids, Michigan

Here is a toy that has much in its favor as it requires accurate work, and with a little patience and practice becomes not merely a noise maker but a musical instrument. The problem is small and uses thin stock, therefore much wood that is in the scrap box as waste may be utilized. If a lathe is available, a turned handle may be made for the plunger. As an alternative, an octagonal handle, as shown in the detail, may be substituted and all work is then done at the bench.

The stock bill follows:

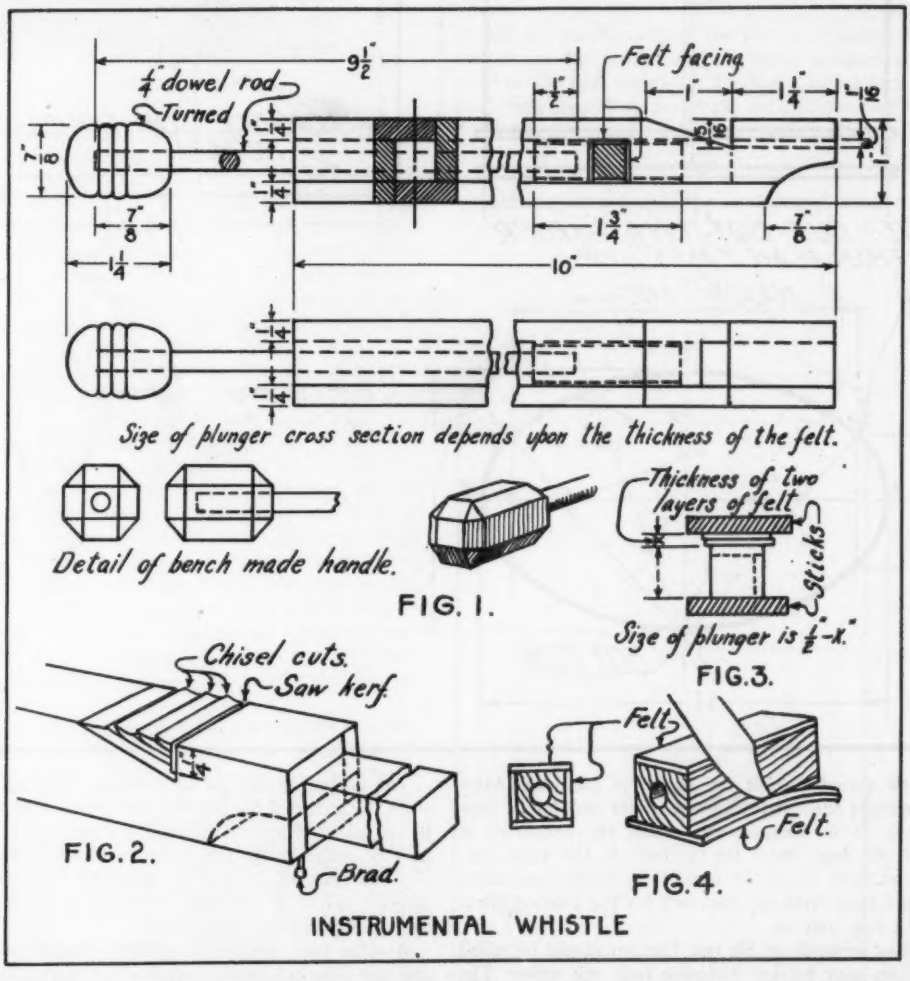
Stock Bill

Rough Size	*Finished Size*	*Stock*	*Use*
4 pc. 5/16 x 1 x 11	¾ x ¾ x 10	Gumwood	Tube
1 pc. ⅝ x ⅝ x 5	13/32 x 13/32 x 1¾	Gumwood	Plunger
	½ x ½ x 1¼	Gumwood	Plug
1 pc. 1 x 1 x 3¼	⅞ x ⅞ x 2¼	Gumwood	Handle
1 pc. ¼" dowel rod, 9½" long, maple			

The tube, which is constructed first, is made of four pieces of exactly the same width and thickness, with all edges planed absolutely square with the face. Variations in the width of the pieces will bring about a variation in the cross section of the tube, which, in turn, will cause the plunger to either bind or slide too loosely through it. If the edges are not square, the tube will be out of square and the plunger will not fit snugly. The tube is built up by gluing and nailing two adjacent sides at a time and then assembling the two sections. At the mouthpiece end a wedge-shaped opening is to be cut. See that no nails are driven into the stock in this space. Also note that the mouthpiece end is cut away on the underside. Study the working drawing shown in Figure 1. Do not drive the nails way in, as they must be withdrawn before this part can be sawed to shape. Butt joints are used throughout. Avoid the use of too much glue and be sure that no nails enter the inside of the tube or even bulge the inner wall, as this will cause binding of the plunger at that spot. Any glue at the corners may be removed or leveled off on the inside with a small square-cornered stick of a ¼-in. chisel. See sectional view, working drawing, Figure 1.

As soon as the tube is completed, lay out the wedge-shaped opening in the top at the mouthpiece end. Use a tee bevel for the two oblique lines on the sides and a try-square for the others. A knife is used on all lines except the one where the oblique cut enters the wood. This line is drawn with a sharp pencil. Before the wedge-shaped opening can be cut, to prevent possible splitting off or chipping on the inside, a plug must be made to fit snugly in the end of the barrel. This same stock serves later as a plunger and plug for the mouthpiece. The extra length serves as a means of withdrawing it from the tube after the wedge-shaped opening has been cut. Push the plug about 1¾ in. into the mouthpiece end of the barrel. About ⅜ in. from the end and on the underside, drive a ¾-in. brad so that it projects a little way into the plug. This will hold it in place while the wedge-shaped opening is being cut.

With a backsaw, cut the forward or perpendicular end first, cutting only ¼ in. deep. The final depth is cut with a chisel (see Fig. 2). If the opening is cut too large, the whistle will not sound loudly nor blow easily. Withdraw the brad holding the plug in place and remove the plug. Saw off a piece 1¼ in. long and plane 1/16 in. from the upper face. This is done by holding the plane, sole up, in the left hand and working the piece, held firmly in the fingers of the right hand, across the cutter of the tool. The plane should be set for a light cut. Avoid hooking the fingers on the sharp edge of the cutter. With the proper amount removed from the piece it may be glued and bradded in place. A small wooden wedge should be pushed into each end of the slot or opening, temporarily,



while the brads are driven in place so that there will be no danger of the plug working up slightly, forming an opening at the bottom.

Draw the curve for the underside of the mouthpiece. See that any nails that would project in this area are withdrawn and then cut to the line with a band saw. Use a coping saw if no band saw is available. File and sand the curved surface smooth. Square off both ends if uneven. With a fine nail set, drive all nails below the surface and fill all holes with filler or putty.

The size of the plunger is determined by the thickness of the felt used. The latter may be obtained from an old felt hat or from an old pennant. Use the remaining plug stock to make a plunger by planing two adjacent sides. The amount to plane off is found as follows: Place two layers of felt and the plug stock between two sticks, such as a couple of rulers. Measure the inside distance between them. The difference between the thickness of the plug stock and the measurement just taken will be the amount of stock to remove (see Fig. 3). It is planed off in the same manner as that removed from the mouthpiece plug. Use a ¼-in. wood drill and not an auger bit to make the hole in the end of the plunger. Hold the piece in the hand while drilling and turn it occasionally to line it up with the drill so the hole will be straight. Glue a piece of ¼-in. dowel rod in the plunger hole and secure it with a small brad. Glue and trim a piece of felt on two opposite faces of the plunger, as shown in Figure 4. Next, glue a piece to each of the other faces, overlapping the first felt. Trim them flush with the felt on the first two sides. Allow the glue to dry and the plunger may be fitted into the barrel. The handle on the plunger is best turned on a lathe, though very nice handles may be made at the bench by planing the stock octagonal in shape (see detail and sketch, Fig. 1).

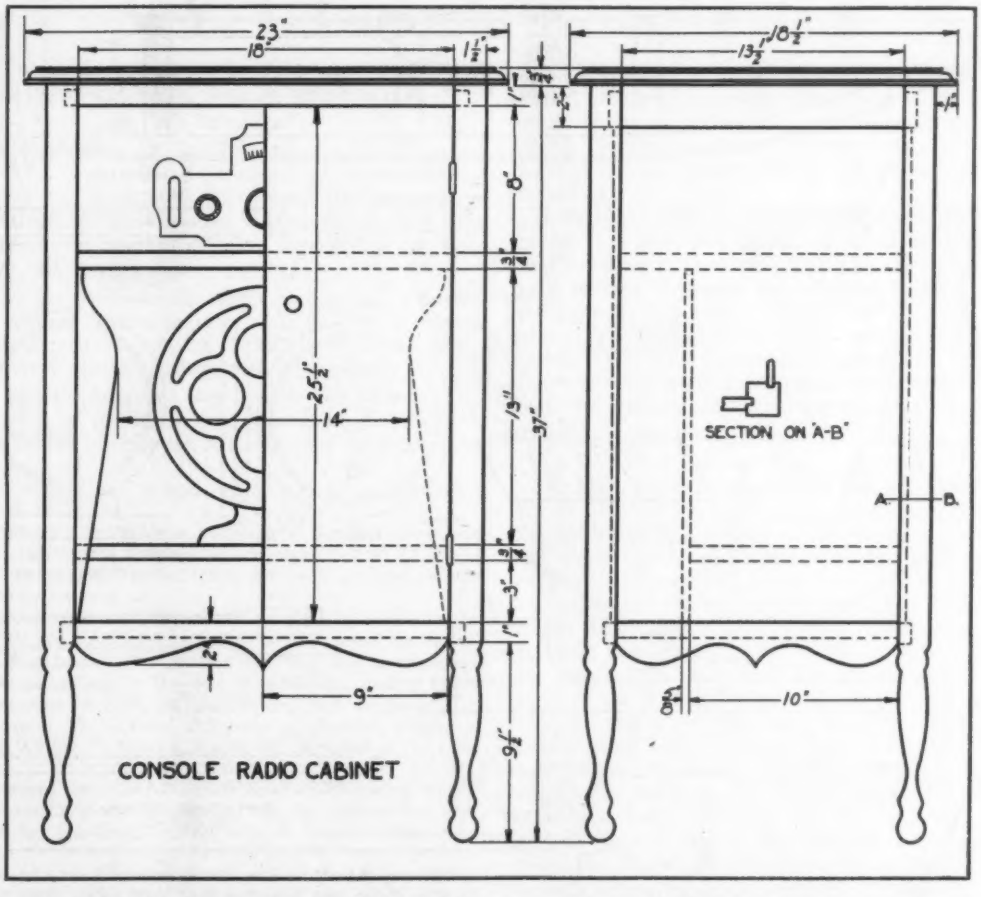
To finish the whistle, sand it carefully with fine sandpaper and paint or lacquer it in the desired colors. Be sure that the mouthpiece end is perfectly dry before attempting to apply paint or it will peel off. Two colors, complements of each other or values of the same color are excellent to use. The underside of the mouthpiece, the opening or slot in the top, and the dowel may be painted one hue, while the barrel and plunger handle may be painted in the second color value.

To play on this whistle, blow into the mouthpiece end as you hold the barrel in the left hand, quite close to the body. The left forearm or wrist should be against the chest. The right forearm also should rest against the body. Grasp the plunger handle with the right hand, then by slightly moving the wrist, notes close together in the scale may be produced. Notes an octave apart may require a slight arm movement. Air pressure will have to be controlled by the mouth. With practice, it will be easy to estimate accurately the distances to move the plunger for any note in the scale. After one has become accustomed to the sliding of the plunger and the latter works freely, any melody may be played with more or less success.

CONSOLE RADIO CABINET

Leon A. Orr, Bennington, Vermont

This cabinet has been designed for one of the popular makes of all-electric radios. The radio, metal case and all, may be placed on the upper shelf, and the speaker on the shelf in the center. The narrow shelf at the bottom is for the log book, and radio magazines. These shelves fastened to narrow cleats which may be moved up or down to accommodate any radio or loud-speaker.



The cover of the cabinet is hinged and the back is made either of a thin wooden panel or a panel of copper screen. In either case, the panel or a part of it should be removable to allow access to the rear of the radio.

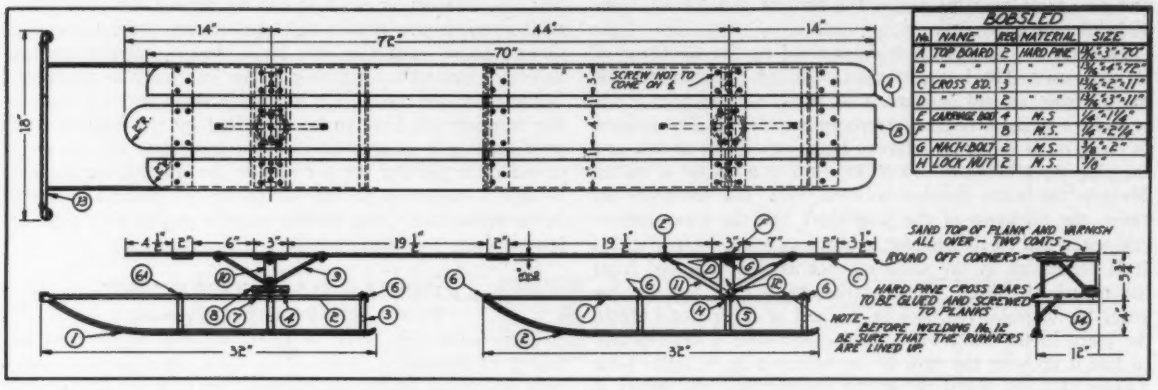
The lower shelf and ornamental brackets look best when placed a few inches back from the doors.

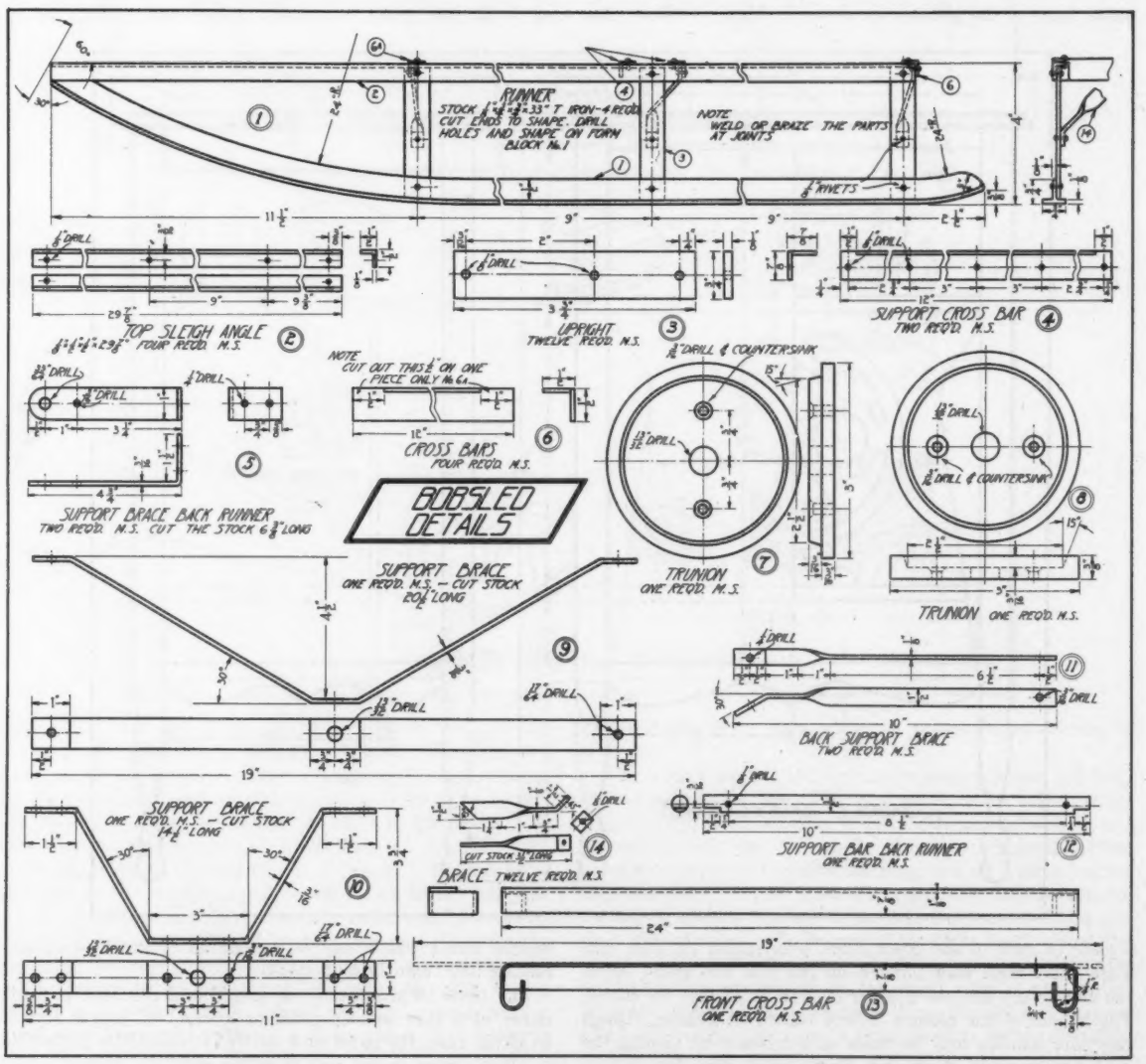
A BOB SLED

W. Ray Challoner, Appleton, Wisconsin

The project described herewith combines cold metal bending, laying out, riveting, brazing or welding and some woodwork. It also affords a job on which the metal-working shop, the cabinetmaking shop, and the finishing department may all coöperate.

The top board or plank is made of hard pine and the drawing gives all the information necessary. There are, however, one or two suggestions that the writer would like to make about the mechanical operations on this problem. The runners are made of T iron, and in order to form these all alike, it is suggested that a bending form be made. A piece of hard maple may be used for the form by cutting a saw slot in the


BOBSLED
No. NAME REQ. MATERIAL SIZE
A TOP BOARD 2 HARD PINE 1⅛"×3"×70"
B " " 1 " " 1⅛"×4½"×72"
C CROSS BD. 3 " " 1⅛"×2½"×11"
D " " 2 " " 1⅛"×3"×11"
E CARRIAGE BOLT 4 M.S. ¼"×1¼"
F " " 8 M.S. ¼"×2½"
G MACH. BOLT 2 M.S. ⅜"×2"
H LOCK NUT 2 M.S. ⅜"
14" 72" 44" 14"
70"
SCREW NOT TO COME ON ℄
SAND TOP OF PLANK AND VARNISH ALL OVER – TWO COATS
ROUND OFF CORNERS
HARD PINE CROSS BARS TO BE GLUED AND SCREWED TO PLANKS
NOTE- BEFORE WELDING No. 12 BE SURE THAT THE RUNNERS ARE LINED UP.
32"
12"


RUNNER
STOCK 1"×1"×.33" T IRON-4 REQD. CUT ENDS TO SHAPE. DRILL HOLES AND SHAPE ON FORM BLOCK No. 1
NOTE WELD OR BRAZE THE PARTS AT JOINTS
⅜" RIVETS
TOP SLEIGH ANGLE FOUR REQD. M.S.
UPRIGHT TWELVE REQD. M.S.
SUPPORT CROSS BAR TWO REQD. M.S.
NOTE CUT OUT THIS ½" ON ONE PIECE ONLY No. 6A
CROSS BARS FOUR REQD. M.S.
SUPPORT BRACE BACK RUNNER TWO REQD. M.S. CUT THE STOCK 6⅜" LONG
BOBSLED DETAILS
TRUNION ONE REQD. M.S.
SUPPORT BRACE ONE REQD. M.S. – CUT STOCK 20½" LONG
BACK SUPPORT BRACE TWO REQD. M.S.
SUPPORT BRACE ONE REQD. M.S. – CUT STOCK 14½" LONG
SUPPORT BAR BACK RUNNER ONE REQD. M.S.
BRACE TWELVE REQD. M.S.
CUT STOCK 3½" LONG
FRONT CROSS BAR ONE REQD. M.S.

BOB SLED, DESIGNED BY W. RAY CHALLONER

edge of the jig piece for the leg of the T bar.

After the material has been cut for the runner pieces Nos. 1, 2, and 3, they should be laid out, drilled and formed, care being taken to lay them out for right- and left-hand runners. After they are assembled with rivets, the pieces may be brazed or welded together.

In order to insure the runners being parallel and to hold them in place while welding on the cross bars 6, 4, and 13, a jig should be made out of a piece of wood 12 in. wide. The runners should be clamped against the edges of this piece of wood to keep them parallel while the cross bars are welded in position.

The brace, No. 14, should then be riveted in place on upright, No. 3, and brazed or welded on both ends. Piece No. 7 makes a small lathe job and can be brazed or riveted to its supporting members.

Piece No. 12 should not be welded to the rear sleigh member until the assembly has been completed. Then by placing the straightedge along the runners, they can be lined up and piece No. 12 brazed or welded in place.

A Coöperative Study Fostered by the A. V. A. Committee on Standards

PART V—A TENTATIVE ANALYSIS OF PRINTING FOR HIGH SCHOOLS

R. W. Selvidge*

The complete plan for this coöperative analysis was set forth in detail on page 189 of the May, 1931, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION. The summary is here repeated for the information of those who did not have an opportunity to read the complete statement of the plan.

Summary of the Plan

In order to coördinate the efforts of a great number of teachers who are engaged in attempts to analyze the various industrial-arts subjects and the skilled trades for the learning units involved, the following plan is proposed:

How the Individual Shop Teacher Can Help

On account of the importance of such an analysis as a basis of effective teaching the following plan for coöperative effort is proposed.

1. Every teacher who is interested in such an analysis should join in this undertaking.
2. All industrial-arts subjects, as taught in the high school, are to be analyzed, for the learning units involved.
3. That the principal skilled trades are to be analyzed for the learning units involved.
4. Tentative analyses of the selected subjects, or trades, are to be published and distributed as rapidly as may seem practicable.
5. Any shop teacher or supervisor who is willing to coöperate, or to offer suggestions in the way of modifying, adding to, or taking from, the original list, should send such suggestions or comments to R. W. Selvidge, University of Missouri, Columbia, Mo., or to William T. Bawden, Peoria, Ill., chairman of the committee.
6. Suggestions thus received should be carefully studied, edited, and incorporated, as far as possible, into the original lists, and the revised lists published, together with the names of those who coöperate.
7. Those who are interested should send in the analysis of any subject, or trade, which they have prepared, and which may be used by the committee as the basis of the preliminary analysis. This form of coöperation will be of great value in getting more satisfactory preliminary lists of units.

In order to get the project started, a tentative analysis of printing follows. Those who are interested in coöperating in this matter are asked to study this outline with the view of adding to it anything that should be taught which is not in the list and striking out anything which should not be taught. Teachers should feel free to change the wording of any item to make it more definite, or more inclusive, or more exclusive.

In the study of the tentative analysis the best plan for the teacher is to take some of the jobs which he is using in his shop and analyze them with regard to this list of learning units. Perhaps the easiest way of doing this is to place the learning units in a vertical column, the jobs in a horizontal column, and check each unit in the column in which the job appears. *There must be definite working drawings and specifications for each job, or a correct analysis is impossible.* If it is found that the jobs contain learning units not in the list, such units should be added.

The Tentative Analysis of Printing

Printing in the school occupies a position somewhat different from that of any other industrial subject. It represents one of the great industries of the world, and one that is very widely distributed. There is scarcely a hamlet that does not have its printshop. In school there is always a demand for printing. Indeed the demand for production work from the printing department often is so great that it seriously interferes with instruction.

In most of the other industrial subjects taught in school the skills are of more or less value in the daily life of the home, but this is not true of printing. The contribution that printing makes must be found largely in the development of appreciation and understanding of the processes which place in our hands the books and papers we read, and in giving a better basis for a judgment of values in printed material. This is a phase of training which should never be neglected.

Only the simpler phases of printing can be undertaken in the high school, but these are fundamental to all divisions of the industry. The list of learning units should be rather complete in order to cover the material to be presented in schools where much time is given to the subject, and teachers may select from the list in schools where less time is given to it.

*University of Missouri, Columbia, Missouri.

The Learning or Teaching Units

The things you should be able to do:

1. To locate instantly any letter or character in the case.
2. To plan a job.
3. To set the composing stick to measure.
4. To hold a stick.
5. To set type — straight matter.
6. To take a proof on a proof press.
7. To take a stone proof.
8. To read the proofreader's marks.
9. To make corrections.
10. To overrun type.
11. To dump a stick.
12. To tie up a form.
13. To distribute type.
14. To put away leads and slugs.
15. To care for an ink stone.
16. To set display type.
17. To wash type and rules.
18. To lay a case.
19. To clean a case.
20. To use initial letters.
21. To use quotation marks.
22. To set tabular matter.
23. To lock type in a galley with a side stick.
24. To set a rule blank of two or more columns.
25. To read and mark proof.
26. To lead type.
27. To set two columns in one measure.
28. To set a rule border.
29. To make up pages.
30. To get specifications.
31. To collect material for job.
32. To set business cards.
33. To lay out the job.
34. To lock up a form for the platen press.
35. To put on the grippers.
36. To put a form on a platen press.
37. To remove a form from the platen press.
38. To put on a new tympan.
39. To set the guide pins.
40. To regulate the impression.
41. To oil the press.
42. To ink up a press.
43. To wash up a press.
44. To feed a job press.
45. To figure paper.
46. To count sheets of paper.
47. To cut paper.
48. To jog stock.
49. To tab stock.
50. To do hand folding.
51. To set a book heading.
52. To set a calendar.
53. To set a rule job in two forms.
54. To set a title page.
55. To set a program.
56. To set a menu.
57. To set an announcement.
58. To set a cover page.
59. To set typewriter type.
60. To divide for colors.

The things you should know:

1. The names of the principal tools, materials, machines, and equipment.
2. The printer's system of measurement.
3. The sizes of type.
4. The component parts of type.
5. The principal type faces.
6. How paper is made.
7. The principal kinds of paper used in printing, and the type of work for which each is generally used.
8. Methods of designating quantities, sizes, and qualities of paper.
9. Composition and care of inking rollers.
10. Kinds of ink and methods of handling it.
11. The ethics of the trade.
12. History of the trade.
13. Opportunities and requirements of the trade.
14. How cuts are made.
15. The rules for punctuation.
16. The rules for capitalization.
17. The rules for spelling.
18. The principles of balance and proportion.

What you should be:

This list of attitudes and habits which contribute to the success of individuals in any vocation was given on page 191 in the May, 1931, issue of this MAGAZINE, and need not be repeated here.

SIMPLIFIED SHOW-CARD PEN LETTERING

W. A. Thompson, Principal, Thompson School of Lettering, Pontiac, Michigan

Lesson I

In commercial lettering it is imperative that show cards, price tickets, and posters be lettered quickly and accurately. To meet the exacting requirement of modern mercantile operation, it is necessary that an up-to-the-minute lettering medium be used.

Lesson I contains a practical alphabet with suggestions for easy and rapid advancement in pen lettering. The shading pen produces two colors, or shades, at a single stroke of the pen and from one color of ink. The operator simply manipulates the pen the same as an ordinary pen or lead pencil; the

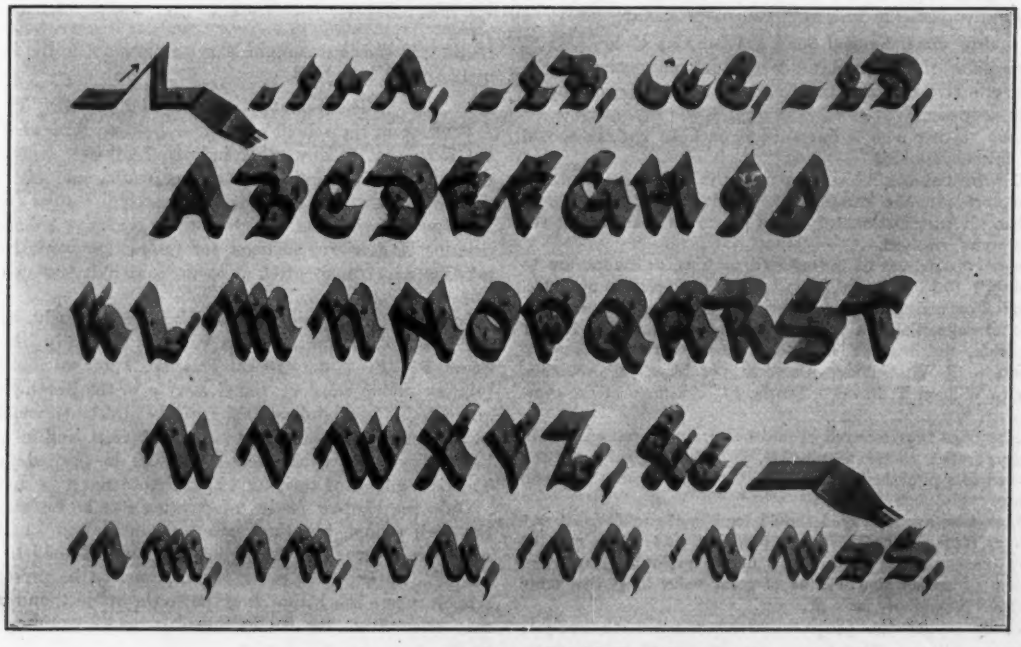


FIG. 1. THE NUMBERS INDICATE SEQUENCE OF STROKES

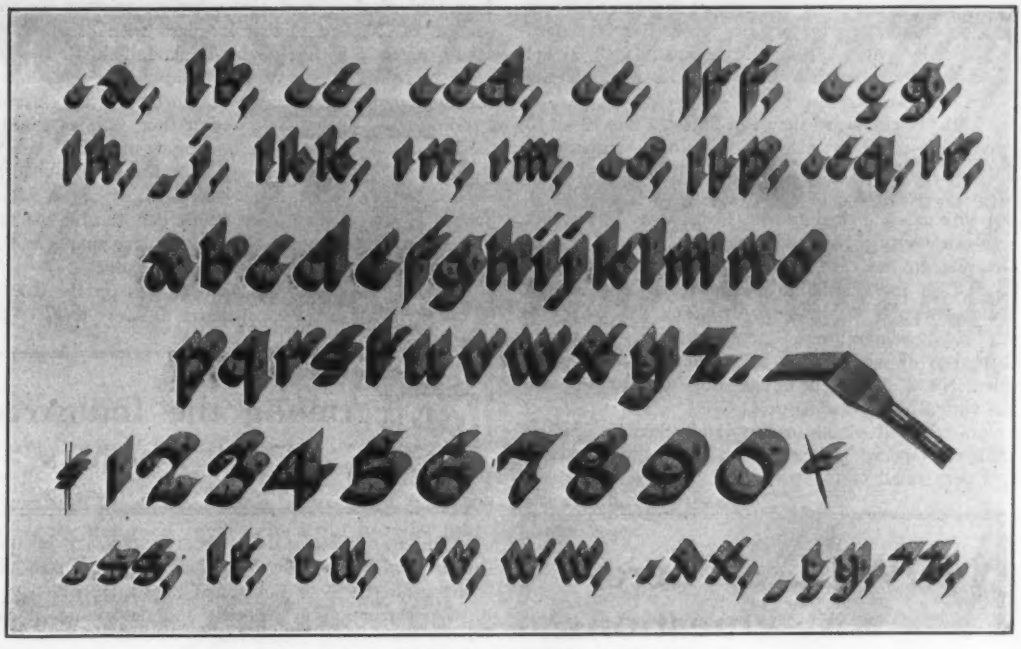


FIG. 2. LOWER-CASE VERTICAL ALPHABET

shading of each stroke being produced wholly by the pen. To combine the shade, or flat tint, in building up a finished letter in this style of alphabet, a careful study of the construction of each letter is important, as success in shading pen lettering depends almost entirely upon a definite knowledge of how and when each part or stroke of the letter is made and connected. In order to acquire the proper method, the vertical and horizontal strokes, and the right and left strokes, of the letter O should be practiced carefully. To begin, the work should be kept compact. This will aid in forming letters true and well balanced, with uniform shading in each.

The pen should be held in a natural way, similar to that of holding a lead pencil. For practice, the capital letters should be about 1 in. high (when using a No. 5 pen). The small or lower-case letters should be about 5/8 in., while the tall lower-case letters, b, h, l, etc., as shown in the lower-case plate (Fig. 2), should be the same height as the capital letters. The construction of the different letters is given in Figures 1 and 2. The small numerals show the order in which the different strokes are made in forming a complete letter. If particular attention is given to the construction of each letter, it is easy to acquire the knack of neatly joining the different parts to bring out a well-balanced letter, with clear and distinct shading.

In making letter S, begin with a stroke at the base line, then add the second or middle stroke; the top stroke being the last made, as indicated in alphabet plate (Fig. 1). Place the pen on the base line of lettering before starting the movement, and stop each stroke or movement before, or as, you raise the pen.

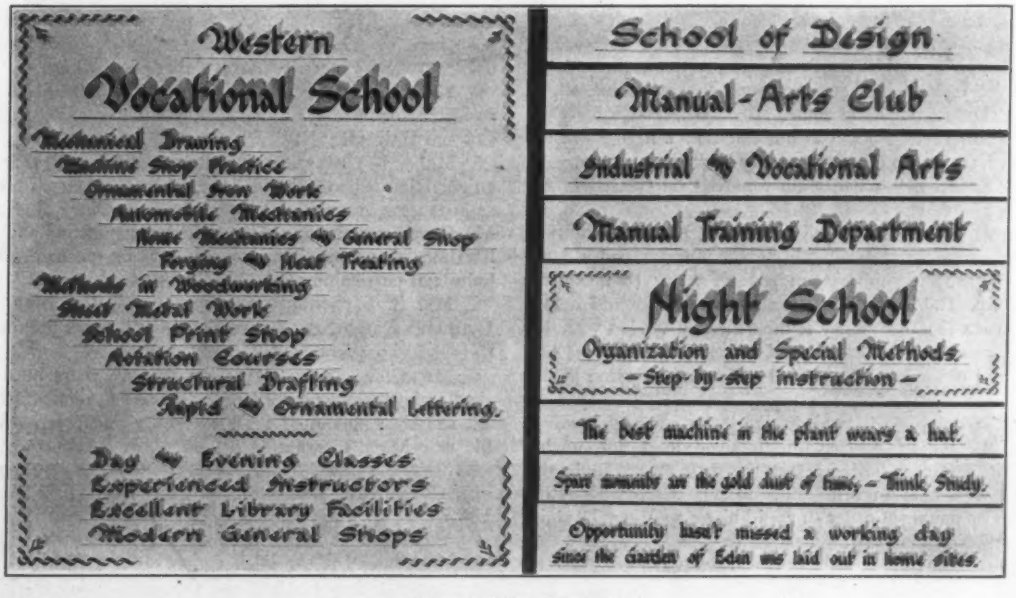


FIG. 3. SAMPLE POSTERS

Almost any kind of manila or white paper that has a smooth surface will be satisfactory for practice work. For cardboard use, 2-, 4-, or 6-ply white. Quarter sheet cards, 11 by 14 in., should be 6-ply stock. Smaller cards may be made of the lighter 2-, or 4-ply stock.

The size of the original card shown in Figure 3 was 18 by 20 in. The word "Western" was made with a No. 5 shading pen, ½ in. wide. "Vocational School" was lettered with a No. 8 shading pen, ⅞ in. wide. The list of studies which follow were made with a No. 4 shading pen, ⅜ in. wide. The corner pieces were made with a No. 5 shading pen.

The lettering on the card sign strips "School of Design, Manual Arts Club, Industrial and Vocational Arts and Manual Training Departments" was made with a No. 5 shading pen. The words "Night School" were lettered with a No. 8 shading pen, and the rest of the lettering and the corner pieces were made with a No. 4 shading pen. The three motto cards also were made with a No. 4 shading pen.

A little practice will enable teachers and others to produce a wide range of special poster announcements in attractive colors at a very small cost.

NOW, Are There Any Questions?

PROTECTING THE TOOLS

951. Q.: Please tell me the best thing to use on tools and machine parts during the summer vacation to prevent rust. —*M. H.*

A.: A moisture-repellent coating for tools and machines may be made by mixing 1 qt. of kerosene oil, ¼ pt. of linseed oil, and about ½ oz. of powdered resin. After this has been mixed thoroughly it may be applied with a brush and can be easily removed when the tool is again wanted.

REFINISHING PINE

953. Q.: Will you kindly advise me about the refinishing of a native pine bureau? Three coats of paint have been removed and the surface is quite clean, although I may have to go over it again with alcohol (I presume that is the best) to remove the whitish traces of the last paint. Is stick shellac or plastic wood best for cracks (there are only a few)? And shall the finish be oil or shellac or both? I do not care to darken it a great deal but wish to preserve the grain as much as possible. If it is best for the wood to have some oil, of of course I shall not mind some.

I have had various opinions but felt that I need more authoritative advice and I shall greatly appreciate yours.

Shall oak which has had stain removed be treated in the same way? — *F. V. H.*

A.: In order to get the pine in the best possible condition, carefully sponge it all over with clean hot water and a damp sponge. Do not use more than enough water to make the wood damp. This will bring up all bruises from old bumps so that when the case is dry it may then be sanded with 4/0 finishing paper and a hard-felt pad to get rid of all scratches, bruises, and old paint. The alcohol will be of no value in this respect.

After the case is well sanded, give it a stain coat made of 1 oz. of potassium dichromate dissolved in 1 gal. of hot water. The salt may be bought at the drug store. Apply this carefully with a clean brush and do not touch with either the hands or metal, in order to avoid black spotting. In staining, "start with that which you see the least, end with that which you see the most." Let dry overnight. Do not sand.

Make up a solution of 1 part white shellac and 1 part orange shellac reduced with an equal volume of completely denatured alcohol. Add this complete mixture to an equal volume of "shellac mixing lacquer" with constant stirring. Apply carefully with a double-thick, full-chisel, varnish-flowing fitch brush. Let dry hard. Sand with a split 6/0 garnet finishing paper to a glass-smooth surface. Dust off and apply a second coat. Repeat for three or four coats as desired. Rub the last coat with paraffin oil, or crude oil, FFF pumice stone and a hard felt. When the last part has been rubbed but not cleaned free of sludge, use a heavy pad of cotton flannel, immersed in water and lightly wrung out, to give the final rub with the grain to remove all other rubbing marks and to produce that soft, semigloss so fine on old pine.

The same treatment will do very well for the oak. Use no oil on the raw wood. Stick shellac is O.K. — *Ralph G. Waring.*

Among the Industrial-Arts Teachers

¶ Mr. F. H. McClain, formerly secretary of the vocational board at Madison, Wis., has accepted a position as instructor for the State Vocational Board. He will have charge of the instruction in painting and decorating in Madison, Racine, Watertown, and Beloit.

¶ Miss Caroline E. Nourse, principal of the vocational high school at Elizabeth, N. J., recently received a master's degree from the Colorado Agricultural College at Fort Collins.

¶ Mr. M. H. Dunlap, of Hastings, Minn., has been elected as an instructor in industrial arts at White Bear.

¶ Mr. F. W. Keller has been elected instructor in printing and social science in the vocational school at Watertown, Wis. Other instructors are Mr. O. H. Krause, instructor in auto mechanics and drawing; Mr. L. F. Wolworth, instructor in sheet-metal, drawing, and academic subjects; Mr. V. E. Anderson, instructor in electricity and related subjects; Mr. Henry Pommerenck, instructor in plumbing and related subjects; Mr. G. Noyes, instructor in trade and industrial education; and Mr. B. C. Trueblood, director and instructor in academic subjects.

¶ Mr. Harry Schmid, of Sauk Rapids, Minn., has accepted a position as instructor in the vocational high school at Minneapolis.

¶ Mr. E. J. Schmeichel, an instructor at the vocational school in Two Rivers, Wis., has received a master of arts degree from the State Teachers College at Oshkosh.

¶ Mr. J. C. Hostetler, of Lovington, Ill., has been elected as instructor in manual arts in the University High School of Chicago University.

¶ Mr. A. B. Grayshon, formerly an instructor in the Cooke Junior High School, Philadelphia, Pa., has taken up his duties as instructor in machine-shop work at the Olney High School. Mr. Grayshon will have charge of the organization and administration of machine-shop courses for the mechanic-arts and industrial curriculums.

¶ Mr. S. L. Sondergard, formerly at the High School, Gypsum, Kansas, was elected county superintendent for the next two years.

¶ Mr. C. E. Crofoot, for the past 11 years head of the electrical department at the Utica Free Academy, Utica, N. Y., has been appointed head of the technical department of the new Mont Pleasant High School, of Schenectady, N. Y.

¶ Mr. L. A. Francis will take Mr. Crofoot's place as head of the electrical department at the Utica Free Academy, Utica, N. Y.

¶ Mr. James A. Hoskins, formerly head of the industrial-arts department at the High School, Fort Collins, Colo., has been appointed to teach at the Compton Union High School, Compton, Calif.

WOULD YOU *teach your boy to fly* IN REGAL BUILT BY LE BLOND WRIGHT BROTHERS' *first* AIRPLANE?

No doubt it would be thrilling, but impractical, as the experience would be of little value in maneuvering a modern ship. So it is with machine tools in the class room. You want to teach the boy on modernly designed tools—the kind he will find in shops when he leaves school.

Sales of belt-driven machine tools in recent years have increasingly given way to machines with some form of selective geared speed mechanism, in spite of a big differential in price in favor of belt-driven machines.

Note the distinctive features of the Regal. A request will bring detailed information.

SEE OUR DATA IN BRUCE'S SCHOOL SHOP ANNUAL 1931 EDITION

The Regal is made in five sizes, 10" to 18". Prices range from $275.00 to $947.00, f. o. b. factory.

THE REGAL — A MODERN DESIGN — THE COUNTERPART of LeBlond Heavy Duty Lathes.

EIGHT-SPEED SELECTIVE SLIDING GEARED HEADSTOCK with convenient controls—quick change of speeds—with perfect safety to the operator.

ONE-PIECE APRON in which all studs and gears are rigidly supported. Positive clutch control by means of a convenient trip lever. Simple and safe construction.

QUICK CHANGE GEARED FEED with the drive through feed rod—a lead screw is provided for chasing.

COMPACT, CONVENIENT BUILT-IN MOTOR DRIVE with enclosed vee belt drive, another safety feature.

The R.K.LE BLOND Machine Tool Co.
Cincinnati, Ohio, U.S.A.

When is a Hole Larger than the Drill?

For the answer to this question, refer to page 16 of the "Handbook for Drillers," a 48-page textbook on twist drills and drilling practice. You will find in the "Handbook," in addition, answers to dozens of other questions which enable machine shop instructors to teach the correct use of twist drills.

To help further a better knowledge of twist drills and how to use them properly, we are always glad to send copies of the "Handbook" to school directors and instructors in any reasonable quantities for class use.

A new edition of the "Handbook" is now ready.

The CLEVELAND TWIST DRILL COMPANY CLEVELAND
NEW YORK · CHICAGO · LONDON
SAN FRANCISCO

Association and Convention News

HOME ECONOMICS ASSOCIATION MEETS

The twenty-fourth annual meeting of the American Home Economics Association was held June 22–27, at Detroit, Mich. The central topic of the meeting, "The Rôle of the Home in Individual and Family Development" was discussed from the standpoint of the factors contributing to individual and family growth. Each speaker presented his subject on the basis that the home is the vital social unit in community or national life.

The divisions and the departments of the association held two meetings, at which the speakers discussed the phases of family life included in family relationships, family economics, the house, food, nutrition, and textiles and clothing. An informal report of home-economics interests in national conferences was made by Dr. A. J. Carlson, of the White House Conference on Child Health and Protection, and Mr. James Ford, secretary of the president's conference on home building and home ownership.

The 1932 meeting will be held during the week of June 20, at Atlanta, Ga.

Hold Industrial-Arts Conference in New York State

The vocational and extension division of the New York State Education Department, during the past school year, conducted a series of conferences in New York, Buffalo, and Albany, at which the problems of vocational guidance, industrial arts, and vocational education were discussed. At the first meeting, the subject of industrial arts and guidance was taken up. At the two following meetings, the technical high school, the coöperative high school, and the industrial high school were the topics discussed. The final meeting in May took up the problems of trade-extension work and continuation schools.

The meetings were attended by superintendents, principals, supervisors, and heads of industrial schools.

New Publications

Electricity — A Study of First Principles

By Elmer E. Burns. Cloth, 235 pages, 5½ by 8, illustrated. Price, $1.75. Published by D. Van Nostrand Company, Inc., New York City.

This textbook is written for the beginner. It covers both d.c. and a.c. electricity, and descriptions and illustrations attempt to make plain the first principles of electricity, not in the abstract, but in concrete and practical application.

Elementary Laboratory Aërodynamics

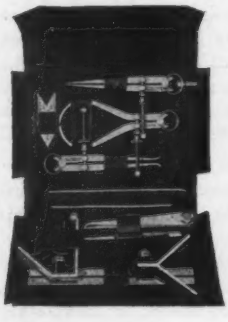
By Arthur L. Jordan. Paper, 67 pages, plus 64 practice-work pages, 25 diagrams and drawings, 5¾ by 8¾, illustrated. Price, 80 cents. Published by The Ronald Press Company, New York City.

This book comprises 21 practical problems which the student can work out in the physics laboratory. The problems are selected to demonstrate the basic principles in a simple, direct manner.

(Continued on Page 20a)

USE STARRETT HACKSAWS

ARE STARRETTS TOO GOOD FOR THEM?



Apprentice Set No. 900 — the nucleus for a fine chest of tools.

The only tools that are "good enough for a beginner" are the best available—Starretts. Starting boys off with anything less is like giving them an inferior multiplication table — just to start on.

With Starrett Tools, your classes will do better work, make faster progress. More than that — they will get, right at first, a healthy respect for accuracy, and the tools that make it possible.

Write for extra copies of the Starrett Catalog No. 25 'CE'.

Starrett Book for Machinists' Apprentices — helps the beginner to help himself.

Starrett Micrometer No. 230

Starrett Combination Square No. 11

THE L. S. STARRETT CO.
World's Greatest Toolmakers
Manufacturers of Hacksaws Unexcelled
Steel Tapes — Standard for Accuracy
ATHOL, MASS., U. S. A.

Use Starrett Tools

5073

a tested blade

in your screw-driver

IT is an "abuse" and wrong—but true—that a screw-driver is called on to do duty for everything from cold-chisel to crow-bar.

No use trying to escape that fact—when a screw-driver is made. Or to dodge it when you buy your screw-driver.

Every "Yankee" blade is individually tested—and twice tested—by "Yankee" toolmakers.

The name "Yankee" on the tool means a blade that won't twist, crack, break, or bend on the edge; and that is "Yankee"—fastened in the handle so that it can't be loosened by use or abuse any time, anywhere.

"Yankee" Screw-drivers are right in design, materials, temper. Well balanced, and with comfort-grip handles, they make work easier. It pays to get a genuine "Yankee."

Chromium Plating over nickeled parts on "Yankee" Tools now adds durability with no increase in price.

No. 90. Standard Style: Fifteen sizes, 1½" to 30" blades. Price, for 5" blade, 50c; 6", 55c; 7", 65c; 8", 75c; 10", 95c; 12", $1.10.

No. 95. Cabinet Style: Eleven sizes, 2½" to 15½" blades. 4½" blade, 40c; 5½", 45c; 6½", 50c; 7½", 60c; 8½", 65c.

"YANKEE" TOOLS

MAKE BETTER MECHANICS

North Bros. Mfg. Co., Philadelphia, U.S.A.
You may send "Yankee" Tool Book (offered in Industrial Arts)—showing Spiral and Ratchet Screw-drivers, Automatic Push Drills, Ratchet Braces, Socket Bit-Extensions, Ratchet and Plain Breast and Hand Drills, Automatic Chain and Bench Drills, Ratchet Tap Wrenches, Continuous-Work Swivel Vises, Plain Screw-drivers, etc.
(Please clip and write name and address in margin below)

(Continued from Page 18a)

Applied Architectural Drawing

By T. R. Abercrombie. Cloth, 156 pages, 7⅛ by 10⅜, illustrated. Price, $1.92. Published by The Bruce Publishing Company, Milwaukee, Wis.

This textbook covers the subject of architectural drawing in a very comprehensive way. In its 11 chapters are found directions for reading plans, fitting the house to the lot, architectural design, how to make architectural drawings, descriptions of different types of houses, planning rooms, the principles of construction for frame, brick, and masonry buildings, the writing of specifications, and estimating.

The book is well and profusely illustrated. The student will find the tables and glossary of terms at the end of each chapter very helpful.

Electrical Drafting and Design

By Calvin C. Bishop. Cloth, 190 pages, 6 by 9¼, illustrated. Price, $2. Published by McGraw-Hill Book Company, Inc., New York City.

This book assists the student of electricity to apply his mechanical drafting in such a way that it will be helpful to him in his work in an electrical engineering office. Besides numerous electrical diagrams and layouts for light and power installations, the author has put in quite an extensive chapter on artificial illumination. Numerous charts and tables help to increase the usefulness of this book.

Trade Associations — Their Services to Education

By S. Lewis Land. Flexible cloth, 141 pages, 5½ by 8¼. Published by the Heating and Piping Contractors National Association, New York City.

This is a study of the trade-association educational progress that has been made by the building trade. The joint responsibility of school and industry is shown, and present tendencies and practices are discussed. The summary contains a brief description of the techniques and procedures used by trade associations in the promotion of organized education for apprentices.

Hand Craft Projects — Book 3

By Frank I. Solar. Cloth, 157 pages, 7¾ by 5⅝, illustrated. Price, $1.25. Published by The Bruce Publishing Company, Milwaukee, Wis.

This is Book 3 of the series written by this author. Like its predecessors Book 1 and Book 2, this last volume aims to furnish the busy teacher, boy-club leader, or camp manager, with problems that can be quickly incorporated in any existing handcraft course. The projects have been chosen for their appeal to the boy. Each project is briefly but clearly described and the directions are so simply given that even a beginner will have little trouble in carrying out the work shown in the drawings.

Color Block Print Making

By Hesketh Hubbard. Cloth, 211 pages, 5¾ by 9, illustrated. Published by The Forest Press, Breamore, near Salisbury, England.

This is a book designed essentially for the beginner. The directions are brief and to the point. Every step is carefully explained. The book is well illustrated.

Guidance and Education of Prospective Junior Wage Earners

By Frederick M. Trumbull. Cloth, 298 pages, 5¾ by 8¼. Price, $3. Published by John Wiley & Sons, Inc., New York City.

This is a careful and comprehensive study made of the problem of the junior wage earner in relation to the type of education which will be of most benefit to him. Vocational guidance and the job of the school counselor are carefully treated. The objectives of part-time education are very well stated and the more up-to-date methods of apprenticeship training are explained. A number of helpful forms that may be used in the classroom are part of the appendix.

(Continued on Page 21a)

(Continued from Page 20a)

Perspective Drafting

By Frank W. Walsh. Paper, 52 pages, illustrated. Price, $1. Published by the author at State Teachers College, Oshkosh, Wis.

This work differs from other treatises on perspective drawings in that the drawings are made by means of measurements with foreshortening scales especially designed by the author. The method permits of extraordinarily rapid work by even an inexperienced draftsman.

Internal-Combustion Engines

By Howard E. Degler. Cloth, 159 pages, 5½ by 8¼, illustrated. Price, $2. Published by American Technical Society, Chicago, Ill.

This book is a clear and concise treatise on the history, theory, method of operating, and constructing of stationary and portable gas and oil engines. It covers the field of the gas engine from the early Otto engine to the present-day aircraft engines.

School Press Management and Style

By Lambert Greenawalt. Cloth, 420 pages, 6 by 8¼. Price, $3. Published by McGraw-Hill Book Co., Inc., New York City.

The author of this book has succeeded in producing an exceedingly helpful book for those who publish a school paper. The entire problem is carefully handled and all of the questions that may confront the busy school official in charge of this work are quite exhaustively treated.

NEWS NOTES

Colleges Give Credit for Trade Experience

Eighteen out of 38 colleges and universities, offering courses for prospective teachers of vocational education in trade and industrial work allow college credits in such courses for trade experience, teaching experience in trade schools, and for supervisory and administrative experience in vocational education, according to a recent statement of the Federal Board for Vocational Education.

The number of credits allowed by various vocational teacher-training institutions for practical experience, the study brought out, varies from 5 in one university, to 32 in another, and the minimum number of years of experience on which these credits are granted is from 1 to 6. There appears to be no consistent practice or uniformity of opinion as to the extent of college credit which should be allowed for trade experience.

Attention was called to the experiment at the Colorado Agricultural College of granting credits for trade experience. This institution has taken the lead in this movement, and other institutions are watching the outcome of the experiment before taking similar action. Experts in the field of vocational education have generally favored the giving of college credit for experience.

The practices of 53 state and endowed colleges and universities and state departments of education offering training for vocational industrial training were represented in the study covered by the Federal Board's bulletin.

Lumber Association Offers Wood Samples

The National Lumber Manufacturers' Association, 702 Transportation Building, Washington, D. C., is again offering sample blocks of wood for school classes. The association has available sets of blocks of 48 different species of Amer-

(Continued on Page 22a)

Start the new term with Genuine PLUMB Hammers

***Now* $1.00; *were* $1.50**

NOW you can afford to equip every school shop bench with a genuine Plumb Hammer—and at the cost of an ordinary tool.

One dollar never bought so much in a school shop tool. This is the identical hammer made, advertised and sold for years at $1.50.

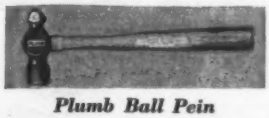
Every feature is intact, including that safety device so important in schools—the Plumb Take-Up Wedge which keeps the handle tight by a turn of the screw.

No change from the quality, design and finish that made the Plumb the leading seller to mechanics and tool lovers—no change except a drastic reduction in price.

Your boys need the best, and when the best cost no more than a bargain hammer, give them Plumb. Specify HF81 for 16 oz. head—HF82 for 13 oz. head.

FAYETTE R. PLUMB, Inc., Phila., U. S. A.

For the school metal-working shop



Plumb Ball Pein
HF372—12 oz.—$1.00

Get the same Plumb quality in Ball Peins, at new, low prices. Same high-grade steel, same perfected design, same safety feature which marks every Plumb Tool as the product of expert craftsmen. Other models at proportionate prices.

PLUMB
DOUBLE LIFE
Hammers Hatchets
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FOR YOUR GENERAL SHOP

Individual Instruction Units

Make Your General Shop a Laboratory of Industry

This series of pamphlet texts has been carefully edited and well illustrated by men especially trained for this work. Each pamphlet is a complete unit in itself. Leaders in Industrial Arts Education proclaim this material to be the answer for the problem of General Shop texts.

Clear — Concise — Authoritative

Enrich your shop activities with the aid of this adequate teaching material. Your students may then gain a clear conception of technical requirements.

Partial List of Electrical Pamphlets, 5" x 7½"

Fundamental Electrical Instruction	45 pp.	41 illus.	$.35
Wiring Unfinished Buildings	69 pp.	118 illus.	.50
Wiring Finished Buildings	38 pp.	43 illus.	.25
Electric Signals	52 pp.	69 illus.	.35

Other Pamphlets for Industrial Arts Classes

AUTOMOBILE	FOUNDRY WORK
AVIATION	MACHINE SHOP
BUILDING	PRINTING
DRAFTING	RADIO

The pamphlets are well made and bound in sturdy, paper covers. They fit nicely into the hand and are convenient to use.

Texts are also in book form.

International Textbook Co.

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(Continued from Page 21a)

ican wood for use in school classes in natural history, raw-material sources, woodworking, and architecture. The blocks are packed in a wooden box and are accompanied by a printed key to the contents. There are labels on each block, giving the amount of lumber of the species produced annually, the habit of growth, the particular qualities, the varied uses, and the name of the regional lumber association under whose grading rules it is manufactured.

The National Lumber Manufacturers' Association will furnish these sets to schools at a nominal charge.

Three Courses Added at Kenton, Ohio

A four-year agricultural course, a four-year commercial course, and a two-year home-economics course have been added to the curriculum of the Forest High School at Kenton, Ohio.

Summer Schools for the Unemployed

The school experiment in keeping two continuation schools open during the summer for the use of unemployed adults desiring to improve their trade training, or to fit themselves for new work, has borne excellent fruit, according to the school officials of New York City. A recent inspection of the two schools, conducted by Mr. W. A. Grady, associate superintendent of schools, revealed that 800 unemployed men and women had applied themselves to the task of learning new trades. Many of those who had been retrained had been able to find new jobs. Hundreds of the unemployed are on the waiting list, and the board of education has considered an expansion of the adult-education work on entirely new lines. One of the encouraging signs of the employment tangle has been the offer of industrial concerns to employ men who have become skilled in a particular trade.

New Project for Building-Trades Class

A new type of class project has been planned for the building-trades class at the Pana Township High School, Pana, Ill., during the school year. The work will consist of building houses of moderate size and the remodeling and modernizing of homes. The work will be done by a class of boys in the high school, under the direction of Mr. E. J. Harrison, the instructor.

School Shop Equipment News

For the Supervisor or Teacher who desires to keep abreast with news of new Machinery, Tools, Supplies, etc.

NEW OLIVER BELT SANDER

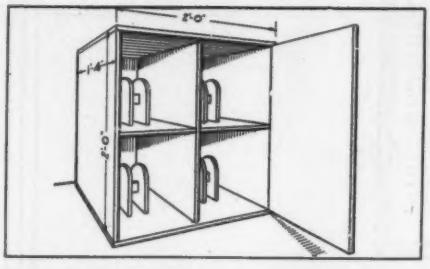
The Oliver Machinery Company, Grand Rapids, Mich., manufacturers of woodworking machinery and machine tools, has announced a new Oliver No. 185-D motor-driven belt sander.

NEW OLIVER BELT SANDER

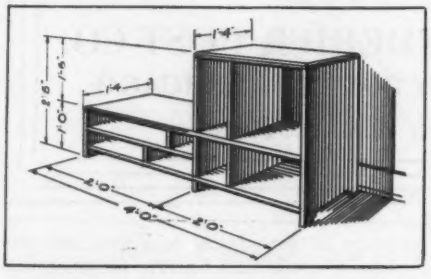
This machine which is a radical departure from other types, has been designed with the school shop in mind. It is simple, compact, reasonable in price, and is capable of meeting many sanding requirements, including the sanding of moldings, table tops, and panels. It is intended primarily for

(Continued on Page 24a)

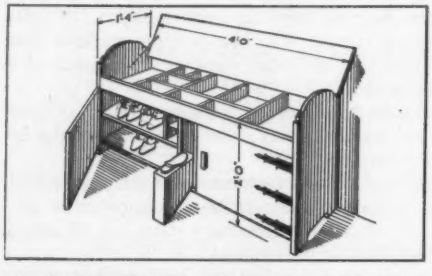
NOW PLYWOOD IS INEXPENSIVE ENOUGH FOR EVERY WOODWORKING USE!



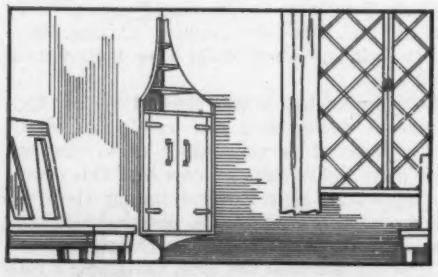
DUST-PROOF HAT BOX: Saves space, keeps hats clean and uncrushed. Easy to make, light and strong—a good project for beginners in manual training.



MODERN SIDE TABLE: Ideal for books, magazines, and bric-a-brac. Inexpensive and quickly built with Douglas Fir Plywood—and may be given any wood finish.



BOUDOIR CHEST AND SEAT: Easy to make of Plywood. Generous space—compactly arranged—for stockings, lingerie, shoes, hats and other articles, and a disappearing foot-rest.



CORNER CUPBOARD: Handy for dining room or sewing room—or for a boy's own bedroom. An attractive and serviceable article, light in weight and low in cost—if made of Douglas Fir Plywood.

STUDENTS may now enjoy the advantages of genuine Douglas Fir Plywood—at *less* cost per surface foot than ordinary lumber.

Because of its freedom from splitting, shrinking or swelling, Douglas Fir Plywood is ideally suited for scores of manual training jobs — for cabinets, table-tops, camp kits, benches, screens, modern furniture — in short, wherever large-size, true-working boards are needed.

Douglas Fir Plywood saws easily in any direction, drills perfectly, and may be sanded and finished like solid lumber. It comes in panel sizes up to 4 feet wide and 8 feet long, and in various thicknesses — 3/16″, 1/4″, 3/8″, 1/2″, 3/4″, and thicker — to meet the needs of any job.

If your local lumber dealer does not carry a full assortment of Douglas Fir Plywood, he will be glad to order for you, at current low prices. Remember, by supplying your stockroom *now* you can make substantial savings on your lumber costs throughout the entire school year.

More information about Douglas Fir Plywood, and plans for attractive new manual training projects are now ready for distribution—free to instructors.

Big Panels of True-working Lumber—in Sizes up to 4 feet wide and 8 feet long.

DOUGLAS FIR PLYWOOD

REAL LUMBER
Engineered for greater size and strength

Douglas Fir Plywood Mfrs., Dept. 1031-L,
Sixth Floor, Skinner Bldg., Seattle, Wash.

Gentlemen: Please send me a sample of Douglas Fir Plywood, and a copy of your new manual training projects, both free.

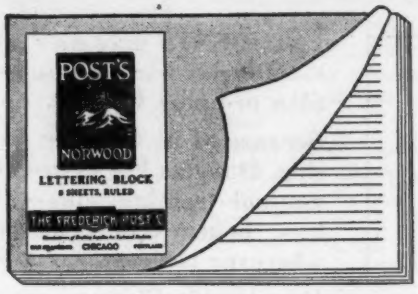
Name_____

School_____

Address_____

City_____ State_____

An aid to better lettering — POSTS' NORWOOD LETTERING BLOCK



ALL ruled and ready to work on. The hard finish and fine texture make Norwood the perfect paper for pencil and ink lettering.

These ready-ruled Norwood Lettering Blocks make lettering practice easy for your students — Try them.

FOR PRICES and SAMPLES
WRITE

THE FREDERICK POST CO.
P. O. BOX 803 CHICAGO

HUGHES-OWENS CO., LIMITED — CANADIAN DISTRIBUTORS

(Continued from Page 22a)

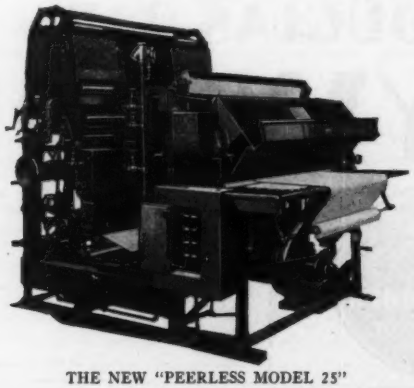
the sanding of wood, but also may be used for sanding straight, flat, or irregular surfaces of sheet steel, bronze, compositions, and many other materials.

The Oliver belt sander comes in three distinct and separate units, each self-contained — the table, the motor stand, and the idler stand, all of which are easily set up and aligned. The table rolls on ball-bearing steel wheels, a hand-wheel is provided for vertical adjustment of the table, and the wheels are of aluminum, with a 7-in. face covered with live rubber. A 2 h.p., 900 r.p.m. motor, furnishes the driving power.

Complete information and prices will be sent to any shop instructor who requests it.

NEW PEASE PEERLESS BLUE-PRINTING EQUIPMENT

The C. F. Pease Company, 813 North Franklin St., Chicago, Ill., manufacturers of blue-printing machinery, has announced its new "Peerless" Model 25 blue-printing equipment, which is the latest development in blue-printing equipment, and embodies new and exclusive mechanical features for producing the finest prints at high speed.



THE NEW "PEERLESS MODEL 25"

It is composed of three units — the blue-printing machine, the washing machine, and the potashing, washing, and drying machine. All units are made in two sizes, 42 in. and 54 in. wide, and the machines may be wired to operate either 220 volts direct or alternating current. The blue-printing machine may be used independently of the other equipment by means of a simple clutch adjustment.

The Peerless Model 25 equipment has a speed range of from 4 in. to 12 ft. per minute, prints accurately, and is fully inclosed for safety purposes.

The equipment is of the best construction, rigidly assembled, and finished in olive-green enamel paint. Lubrication is provided by means of an Alemite greasing system, and all piping and wiring is complete for installation.

Complete information and prices will be furnished to any shop instructor, or school official, upon request.

ISSUE NEW PORTER-CABLE SANDER

The Porter-Cable-Hutchinson Corporation, Syracuse, N. Y., manufacturers of the hand-belt sanding machine, have recently added to their line a new model Type B-10 dustless take-about sander.

The type B-10 sander has a dust-removal system built into the machine. A double-blade fan traveling at 10,000 r.p.m., creates a powerful vacuum, which draws the dust through suitable ports and deposits it into a bag. This feature has a twofold advantage, since it keeps the air clean and prevents the excessive clogging of the abrasive belt, thus causing the latter to cut faster and to last longer.

The motor is of the universal belt type, developing a little over 1 h.p. All wearing parts are hardened, and friction is reduced by using ball bearings. The switch is a 10-ampere

(Continued on Page 26a)

LEADERSHIP

IN THE INSTALLATION OF
PRINTING IN ALL KINDS OF SCHOOLS

More than three thousand schools have installed printing equipments during the last twenty years. Practically all installations were made by the American Type Founders Company. There are several good reasons for this preferment

• First of all, this Company is a nation-wide organization with twenty-five Selling Houses carrying a complete line of type, printing equipment and supplies. Each of these selling houses can furnish promptly to any school within its territory any required item, from a gauge pin up to a Kelly Automatic Press. Only an organization like the American Type Founders Company is in a position to render such satisfactory service with promptness and dispatch.

• In the second place, American Type Founders Company has been the preëminent leader in the printing industry in designing practical type faces of both classic and modern styles, and in developing a splendid line of printing machinery and equipment to meet ever increasing demands for efficiency in production.

• Finally, a high standard of business ethics and integrity requires that every customer shall receive the very best service possible in the way of expert advice relative to his particular requirements. To this end, and realizing that school printing laboratories present problems differing from those of commercial printing plants, an Education Department is maintained, with a staff of experienced educators, from whom any school may receive reliable counsel in planning and organizing its printing department. By means of this service, which is rendered without charge, school officials may obtain an efficient layout showing how the proposed printing equipment should be arranged to secure best results in instruction, together with specifications of every item required to equip the plant properly.

When considering the installation of a new school printshop or the addition of materials for an existing shop, write to

EDUCATION DEPARTMENT

American Type Founders Company

300 Communipaw Avenue, Jersey City, N. J.

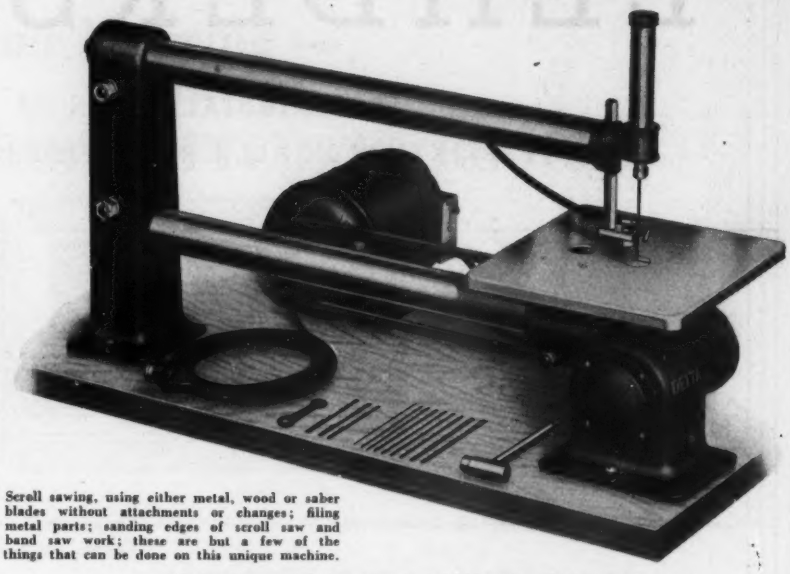
This advertisement is set in Stymie Types, a showing of which will be sent upon request.

YEARS AHEAD IN DESIGN AND PERFORMANCE!

NEW DELTA 24-INCH SCROLL SAW

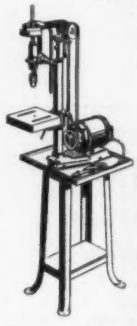
A Revelation in Speed, Accuracy, Rigidity and Versatility

The result of more than five years of research and experiment, the new Delta 24" Scroll Saw is radically different from anything you have seen heretofore. It runs at motor speed. It has an unusual capacity. It is *absolutely rigid*. There is so little vibration that a pencil may be stood on end on the table while the machine is in use. Its universal chuck holds BLADES OF ALL KINDS without extra attachments or changes of any kind. Saber blades are used just as well as ordinary scroll blades. Files and sanding attachments may also be used.



Scroll sawing, using either metal, wood or saber blades without attachments or changes; filing metal parts; sanding edges of scroll saw and band saw work; these are but a few of the things that can be done on this unique machine.

You Owe It to Your Shop to investigate this remarkable machine. The list of the things it will do is too long for inclusion here, but a post-card will bring you full information.



DELTA DOUBLE-DUTY DRILL PRESS

Different from any low-priced tool you have ever seen, the new Delta Double-Duty Drill Press is a precision tool, built to give years of accurate, trouble-free service. Strong, husky construction, graduated quill, ball-bearing spindle, slotted, tilting table, six speeds—these are but a few of the points that make this tool remarkable value. Write for information and prices.

48-PAGE CATALOG NOW READY

The new edition of the Delta Catalog, with its 48 pages of description of QUALITY tools for the workshop, is now ready. Teachers will find it a mine of information on the latest and best practice in the manufacture of workshop machines. Machines that are built to exacting standards of manufacture and performance, yet which sell at prices to meet any appropriation. Send for your copy now.

DELTA SPECIALTY COMPANY

(*Division of Delta Mfg. Co.*)

MILWAUKEE 3775 N. HOLTON ST. WISCONSIN.

(Continued from Page 24a)

double-pole type, housed in a bakelite case, and a lever extends from the switch toward the handle within easy reach of the operator's thumb. Belts may be changed readily and are supplied in any grit or degree of fineness. The sanding shoe is made of tempered steel covered with cork.

A bench stand also can be furnished with this type of

NEW PORTER-CABLE SANDER

sander which converts it into an edge sander or grinder. The abrasive may be used for almost any material, either flat or curved and it saves a great deal of time over hand surfacing. Complete information and prices will be sent to any shop instructor who requests it.

CHRISTIANSEN CHANGES FIRM NAME

C. Christiansen, 2814 West 26th St., Chicago, Ill., manufacturer of laboratory furniture, has announced a change in the firm's name. Hereafter the firm will be known as the Christiansen Company, having been incorporated recently under that name.

DURABILT LOCKER ELECTS NEW OFFICERS

The Durabilt Steel Locker Company, of Aurora, Ill., has announced a change in its office personnel. The new officers comprise Mr. E. D. Kaser, president and general manager; Mr. V. C. Kaser, vice-president; Mr. H. S. Harch, treasurer and manager of sales; and Mr. W. H. Graham, secretary. Mr. D. V. Trapp was appointed purchasing agent, succeeding E. V. Pauly.

ISSUE NEW BOOKLET OF TYPE FACES

The American Type Founders Company, 300 Communipaw Ave., Jersey City, N. J., has just issued a new illustrated booklet, describing its new Century schoolbook-type faces, including Century schoolbook, Century schoolbook italic, and Century schoolbook bold. This interesting addition to the schoolbook types broadens the usefulness of the schoolbook-type family. They are recommended especially for textbook and school printing, which may also be used to advantage on the everyday run of printing work.

Complete information and prices may be obtained by any printshop instructor upon request.

NEW MORSE TAP MANUAL

The Morse Twist Drill & Machine Co., of New Bedford, Mass., has issued an 18-page booklet on taps, which offers a great deal of practical and useful information relative to the construction and uses of various styles of taps. It describes hand taps, taps for special uses, tapper taps, pipe taps, ground thread taps, and offers valuable information on tap lubrication, tap construction, and tap nomenclature.

A copy of the booklet will be sent to any school-shop instructor upon request.